Appendix A

Annual Report To Congress On Ballistic Missile Defense

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Reporting requirements for the Annual Report to Congress on Ballistic Missile Defense as specified by section 224 of the National Defense Authorization Act for Fiscal Years 1990 and 1991, as amended by section 240 of the National Defense Authorization Act for Fiscal Year 1994, as amended by section 234 of the National Defense Authorization Act for Fiscal Year 1996, and as amended by Section 244 of the National Missile Defense Authorization Act for Fiscal Year 1997.

(1) A statement of the basic strategy for research and development being pursued by the Department under the Ballistic Missile Defense program, including the relative priority being given, respectively, to the development of near-term deployment options and research of longer-term technological approaches.

(2) A detailed description of each program or project which is included in the Ballistic Missile Defense program or which otherwise relates to defense against strategic ballistic missiles, including a technical evaluation of each such program or project and an assessment as to when each can be brought to full-scale engineering development (Engineering Manufacturing Development, assuming funding as requested or programmed).

(3) The status of consultations with other member nations of the North Atlantic Treaty Organization, Japan, and other appropriate allies concerning research being conducted in the Ballistic Missile Defense program.

(4) A statement of the compliance of the planned BMD development and testing programs with existing arms control agreements, including the 1972 Anti-Ballistic Missile Treaty.

(5) A review of possible countermeasures to specific BMD programs, an estimate of the time and cost required to develop each such countermeasure, and an evaluation of the adequacy of the BMD programs described in the report to respond to such countermeasures.

(6) Details regarding funding of programs and projects for the Ballistic Missile Defense program (including the amounts authorized, appropriated, and made available for obligation after undistributed reductions or other offsetting reductions were carried out), as follows:

(A) The level of requested and appropriated funding provided for the current fiscal year for each program and project in the Ballistic Missile Defense program budgetary presentation materials provided to Congress.

(B) The aggregate amount of funding provided for previous fiscal years (including the current fiscal year) for each program and project.

(C) The amount requested to be appropriated for each such program and project for the next fiscal year.

(D) The amount programmed to be requested for each such program and project for the following fiscal year.

(E) The amount required to reach the next significant milestone for each demonstration program and each major technology program.

(7) Details on what Ballistic Missile Defense program technologies can be developed or deployed within the next 5 to 10 years to defend against significant military threats and help accomplish critical military missions. The missions to be considered include the following:

(A) Defending elements of the Armed Forces abroad and United States allies against tactical ballistic missiles, particularly new and highly accurate shorter-range ballistic missiles of Russia armed with conventional, chemical, or nuclear warheads.

(B) Defending against an accidental launch of strategic ballistic missiles against the United States.

(C) Any other significant near-term military mission that the application of BMD technologies might help to accomplish.

Appendix B

Current Program, Projects, And Activities - Narrative Description And Status

PROJECT NUMBER: 1155
PROJECT TITLE: Phenomenology
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	FY98	FY99
0603173C RDT&E	18,309	26,740	26,205

PROJECT DESCRIPTION:
To prepare for critical future missile defense needs, advanced technology programs will conduct a balanced program of high leverage technologies that yield improved capabilities across a selected range of boost, midcourse, and terminal phase missile defense interceptors, advanced target sensors, and innovative science. The objectives of these investments are subsystems with improved performance or reduced costs for acquisition programs, and technical solution options to mitigate advanced and unpredicted threats.

This program provides the United States with the data and predictive tools to generate high confidence target signatures for Ballistic Missile Defenses (BMD). This is a critical adjunct to the evaluation of BMD system performance across the full spectrum of threats and engagement scenarios. This program provides data collection sensors and instruments for use on live-fire missions and provides analysis of the resulting test data. This program provides predictive models of target signatures in both Radar and Infrared spectrums. This program evaluates and develops algorithms for the critical functions of discrimination, target handover, and aim point selection. This program provides for data storage and retrieval of all BMDO-sponsored tests per statutory requirements.

Space-based Phenomenology Program Database Development is the work to expand the database for background data through the analysis of Midcourse Space Experiment (MSX) data. This effort will include analysis of the background data for its impact on current and future elements of the NMD program, especially the Space Based Infrared System (SBIRS).

Data Collection is the program to provide effective and robust threat signature collection for ballistic missile defense programs. This program analyzes existing and emerging requirements for signature data collection capabilities. This program provides mission planning for all BMDO signature collection activities. These activities include providing for the maximum use of existing high altitude data collection aircraft to collect ballistic threat signatures in all phases of flight. Signature data dissemination and modeling tie-in with higher level simulations will be developed. Evaluation, development, and employment of several types of potential data collection sensors will be conducted per the direction of the Office of the Secretary of Defense (OSD). This program develops responsive access to stored signature data. This program provides exploitation of new signatures provided by emerging sensing techniques.

PROJECT NUMBER: 1155
PROJECT TITLE: Phenomenology
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	FY98	FY99
0603872C RDT&E	31,338	37,835	38,622

PROJECT DESCRIPTION:
This project provides the United States with the data and predictive tools to generate high confidence target signatures for Ballistic Missile Defenses (BMD). This is a critical adjunct to the evaluation of BMD system performance across the full spectrum of threats and engagement scenarios. This program provides data collection sensors and instruments for use on live-fire missions and analysis of the resulting test data. This program provides predictive models of target signatures in both Radar and Infrared spectrums. This program evaluates and develops algorithms for the critical functions of discrimination, target handover, and aim point selection. This program provides for data storage and retrieval of all Ballistic Missile Defense Organization (BMDO)-sponsored tests per statutory requirements.

Data Centers and Management. Storage, archival and retrieval of signature related data is provided by the BMDO-funded Missile Defense Data Center (MDDC) and Advanced Missile Signature Center (AMSC). The MDDC is the primary repository of THAAD data. Both the MDDC and AMSC meet the statutory requirements for program data archiving.

Data Collection Platforms. This project provides core operating costs for Airborne Surveillance Testbed (AST) target signature collection sensor and platform. Mission costs for AST are provided by using acquisition programs. This project provided FY96 termination costs for the COBRA EYE sensor. This project monitors other BMDO signature data collection programs to ensure complete coverage and avoid duplication.

Analysis, Algorithms, and Modeling. This project performs analysis of radar and optical data on ballistic missile threat signatures and intercept events for the THAAD Radar, THAAD interceptor, and Navy TMD programs. This project develops and evaluates discrimination and kill assessment algorithms for THAAD Radar. This project develops signature models and modeling tools applicable to TMD threat profiles and flight regimes leveraging off investments made in TMD modeling and modeling tools.

For analysis this project provides accurate, objective, and timely flight data analysis in support of target signature phenomenology characterization and sensor algorithm development and evaluation. This includes TMD optical sensor data from THAAD, project 1170, project 3270, and others. This project provides post-flight characterizations of expected and unexpected target features. Under the guidance of the Target Signatures Working Group (TSWG) develop target models and provide high fidelity signature sets of THAAD Dem/Val and User Operational Evaluation System (UOES) targets. Evaluate THAAD software aim point selection, discrimination, and handover algorithms against Dem/Val targets and UOES threats. Provide analysis and recommendations for TMD aim point selection, discrimination, and sensor handover.

For THAAD Radar algorithms this project develops and analyzes algorithms that have the highest payoff potential for the critical functions of detection, tracking, bulk classification, typing, discrimination, target object map generation, aim point selection, and kill assessment. Maintenance and upgrades to the simulation facilities required to develop and evaluate these algorithms against real and simulated data is provided for. The Lexington Discrimination System (LDS) will be used to merge radar and optical data analysis on a real-time basis for algorithm development and assessment. Specific tasks include: (1) Use LDS to support development and evaluation of objective system algorithms to be installed on the THAAD Radar, THAAD Interceptor, and Navy TMD programs; (2) Use signature data to identify robust discriminants using field measurements; (3) Develop and deliver individual radar discrimination algorithms based on identified discriminants; (4) Develop, deliver, and exercise on the LDS, algorithms which utilize radar and optical data to facilitate seeker Target Object Map and aim point selection for THAAD and other TMD systems; and (5) Complete the LDS real-time multiple-sensor, multiple target handling capability and test TMD algorithms/architectures using this capability.

For modeling this project provides high confidence, target and background scene predictions for sensors and BMD systems. These generated scenes are the foundation for high confidence simulations of engagements that cannot or will not be flight tested. The high-fidelity, physics-based models, predicted composite scenes, and associated analytic output developed in this task are evaluated against measured data to ensure confidence in simulation results and provide a reliable route to systems verification and validation. To facilitate this objective, this task also provides crucial data-driven software tools for exploiting measured data and integrating measurements with simulations in support of technology development, test and evaluation, and acquisition efforts.

This project also provides for participation in international technical exchange programs in the areas of optical and radar discrimination, reentry, and background and plume phenomenology include: U.S./U.K. Scientific Cooperation Research Exchange (SCORE); use of the U.K. MESAR Radar; NATO Extended Air Defense (EAD)/TMD Ad Hoc Working Group - Plume Phenomenology Expert Group (U.S., U.K., France, Canada); U.S./French Bilateral Group - Plumes, Backgrounds, and Reentry Signatures; U.S./Israeli TBM Signature and Phenomenology Research; and the U.S./German Phenomenology Research committee.

PROJECT NUMBER: 1161
PROJECT TITLE: Advanced Sensor Technology
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0603173C RDT&E	32,797	24,527	22,743

PROJECT DESCRIPTION:
To prepare for critical future active defense needs, advanced technology programs will conduct a balanced program of high leverage technologies that yield improved capabilities across a selected range of boost, midcourse, and terminal phase missile defense interceptors, and advanced target sensors, as well as advances in innovative science. The objectives of these investments are sub-

systems with improved performance, reduced costs for acquisition programs, and technical solution options to counter advanced and unpredicted threats.

The Advanced Sensor Technology Program (ASTP) is BMDO's principal advanced sensor program. ASTP is a joint Army, Navy, Air Force technology development and demonstration program, managed by BMDO. The purpose of ASTP is to provide the sensor technology needed to detect, track, and discriminate advanced (post-2000) BMD threats. The technologies for ASTP were chosen through a technology requirements analysis driven by BMD missions, threats, system requirements, and schedules. Care was taken to avoid duplication with other programs both within and external to BMDO. Starting in FY96, ASTP realigned interceptor-related technology efforts under Project 1270 to correspond with their discriminating interceptor technology focus.

The three Services and BMDO are developing technologies in their Project Reliance areas of expertise. The Air Force is developing passive sensor technology, the Army - ladar technology, and the Navy - radar technology. These technologies will be infused from ASTP into BMDO core programs as they mature.

In addition to development of critical component technologies, the three Services, in conjunction with BMDO, will combine these critical components in an integrated sensor for demonstrating data fusion by FY01. Data from the passive, ladar and radar sensors will be combined (fused) in a BMDO-developed fusion processor for tracking and discrimination.

Real-time data fusion is a central focus of ASTP. It is identified by the technical requirements analysis as the best solution to the difficult signal processing problem. High-speed data fusion algorithms are under development by BMDO for this critical need.

Laboratory and field demonstrations of ASTP technologies are being conducted throughout the program, starting with advanced focal plane imaging demonstrations conducted at White Sands Missile Range (WSMR) NM in FY95. Larger experiments will permit fusion of radar, infrared, and ladar data beginning in FY96 and FY97, when scaled rocket flights will provide initial collocated multi-sensor data for benchmarking of tracking algorithms. The first integrated demonstration of ASTP subsystems will be at the Pacific Missile Range Facility (PMRF), Kauai, Hawaii ground test facility, where radar and optical sensors will detect and track missiles beginning in FY00. Successful performance of the radar-to-system interface and tracking algorithms will signal the transition to the airborne demonstration phase, which begins FY01.

BMDO has selected a Government system integration team led by Naval Research Laboratory/ Navy Air Systems Team (NRL/NAST). This System Integrator (SI) will oversee the installation of ASTP equipment at the test ranges, and will integrate the sensors and other equipment into the P-3 aircraft. Additionally, the SI will operate the ASTP equipment during the airborne demonstrations.

The technologies under development in ASTP are:

Multiple Quantum Well (MQW) Focal Plane Arrays (FPA). MQW FPAs have made rapid progress in the past three years, and are now available in 256x256 format with quantum efficiency

approaching 30%. This technology is important due to its potential for high sensitivity, low noise, high uniformity imaging and low production cost.

Simultaneous Multicolor FPAs. FPAs capable of simultaneously measuring two or more Infrared (IR) wavebands will simplify sensor design for both surveillance and interceptor seekers. The result will be highly sensitive, discriminating sensors which are more reliable, lighter, and less costly than currently available

Smart FPAs. Preprocessing sensor data on or near the FPA greatly improves processing throughout. This provides the overall processing speed needed for real-time data fusion for accomplishing multiple target tracking, discrimination, and tracking low-observable targets in clutter.

Imaging Ladar. Miniature Laser Radar (LADAR) integrated with passive sensors will allow precise tracking and discrimination of BMD targets. Ladar capable of range-doppler and 3-dimensional imaging are under development. Eye safe ladar is being developed for airborne applications. The ladar technology is also consistent with interceptor technology requirements.

Radar. Reliable booster detection and tracking through cloud-cover requires radar observations. ASTP is leveraging an existing NRL airborne UHF surveillance radar technology program based on the APS-145 to demonstrate TBM detection and early ascent phase tracking.

Transmit/Receive (T/R) Modules. The radar T/R Module program will develop and demonstrate technologies required to increase output power and power added efficiency, and reduce the noise figure of 10 Ghz (X-band) T/R modules for use in radars.

Real Time Data Fusion Algorithms. Techniques for combining (fusing) data for tracking multiple targets, discrimination, and sensor optimization are under development. The algorithms are critically needed as principal elements of the fusion processor. They are the central focus of the ASTP data fusion effort.

Russian American Cooperative Programs:

- The RAMOS program is a cooperative effort with Russian scientists and engineers to exchange IR data acquired through remote sensing systems and to develop plans for future cooperative space experiments. This program investigates options to leverage off existing funded experiments to foster a closer working relationship at the technology level between both nations.
- The AGRE is an upper atmospheric joint research project with Russian scientist, using Russian launch vehicles and U.S./Russian onboard sensor packages, Russian ground optical/radar sites, and U.S. MSX satellite to monitor experiments and collect data.

Down Under Early Warning Experiment (DUNDEE). DUNDEE is a cooperative advanced BMD sensor and BM/C^3 technology research demonstration with the Australian Defense Science Technology Organization (DSTO). Objectives are to perform research, demonstration, and post mis-

sion data reduction using the Australian Jindalee Over-the-Horizon Radar to detect TBM and Cruise Missile targets. Specific objectives include: wide area, timely launch detection; target identification using plume doppler signature; and trajectory association with satellite detection reports.

PROJECT NUMBER: 1161
PROJECT TITLE: Advanced Sensor Technology
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0603872C RDT&E	3,334	3,364	3,208

PROJECT DESCRIPTION:
The goal of this program is to develop and demonstrate survivability technologies to ensure that Theater Ballistic Missile Defense (TMD) systems can perform their mission in all required environments. Ballistic missile defenses must be able to operate in nuclear environments and against countermeasure threats. The requirements for the Survivability program are: define, develop and demonstrate Survivability Enhancement Options (SEO) for TMD systems; develop and transfer SEO technology base to research and development centers and laboratories; provide risk reductions to support THAAD Radar Milestone II.

This program develops and demonstrates survivability technologies to ensure that TMD elements can perform their mission in all expected hostile threats. Approaches include: studies/analyses; defense suppression threat mitigation technologies development; developing enhanced shelters applying Camouflage, Concealment and Deception (CCD), SEO development; Electromagnetic Environmental Effects (E3) engineering support, survivability/operability demonstrations, development of issue resolution approaches; development of Anti-Radiation Missile (ARM) Countermeasure Evaluator (ACE); and hardened technology integration. ACE combines the desirable effects of low-cost digital simulations and hardware testing of actual ARM hardware in open- and closed-loop simulations. ACE will be used to develop initial ARM Electronic Countercountermeasure (ECCM) techniques for THAAD/GBR and PAC-3. The multispectral signature of the deployed THAAD Radar system requires application of extensive CCD technologies which have been developed by the Army Labs. Technologies will be available for incorporation into core missile defense systems at Engineering Manufacturing Development (EMD), will provide near-term improvements to existing systems, and will provide necessary risk reduction evidence to support THAAD Radar, and Medium Extended Air Defense System (MEADS) system milestone decisions.

This program has developed tools to evaluate THAAD Radar performance under defense suppression threats and in hostile environments. These evaluations support the THAAD Radar Milestone II decisions. The ACE operational capability was demonstrated. Countermeasures for precision guided missiles and cruise missiles continued to be developed. CCD techniques applied to the THAAD Radar were evaluated for effectiveness in battlefield conditions. Requirements for the THAAD Radar to be protected against electromagnetic environmental effects were reviewed and design guidelines were identified.

PROJECT NUMBER: 1170
PROJECT TITLE: TMD Risk Reduction
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	FY98	FY99
0603872C RDT&E	23,184	35,267	25,045

PROJECT DESCRIPTION:
This project is the primary BMDO risk mitigation program addressing TMD target/threat signature and the sensor-to-system interface issues for all TMD systems. How potential targets appear to radar and infrared seekers is an important issue which allows TMD acquisition programs to limit costs by concentrating designs on narrow bands of key threat signature characteristics. This project consists of five elements: TMD Critical Measurements Program (TCMP) which builds, flies, observes, and analyzes targets with signature characteristics similar to those anticipated on foreign threats; the Target Signature Measurements Program which observes and directs the analysis of signatures from BMDO test targets (STORM, Hera, etc.) to obtain target signature insights, and which exploits other similar threat signature opportunities; the TMD Seeker Test/ Measurements Program which uses an experimental seeker test bed to evaluate emerging missile seeker technologies and to support resolution of unexpected critical problems that emerge during their engineering and testing phases; Kill Assessment Program which investigates the signatures and results of a target intercept; and the Sapphire Statistical Characterization and Risk Reduction (SSCARR) program which determines window/dome reliability and fabrication techniques. In all cases, the target signature data and the analyses address specific questions relating to how a radar first identifies a missile (discrimination), how the radar passes the missile location to a seeker (sensor to seeker handover), how the seeker determines the best place to hit the target (aim point selection), and how the defender can tell if a missile is destroyed (kill assessment). The core sensor costs used in this project to collect target signature data will be provided under projects 1155 and 3360. This project funds the specific sensor tasks for each mission.

TMD Critical Measurements Program. This program supports the risk mitigation efforts in TMD signatures. TCMP is a flight test program where threat representative targets are flown at the Kwajalein Missile Range (KMR) or other facilities to observe typical threat-like objects in flight with a sophisticated suite of sensors. These sensors give both target data and representative signature data as seen by TMD system sensors. The TCMP program performs the analysis on the data obtained in these flights. In all cases, the target and threat data and the analysis address the specific areas of discrimination, target object map handover and aim point selection. The hardware, flight instrumentation and data analysis of the TCMP flights are all included in the TCMP budget. TCMP 2 will consist of three medium range flights, in the fourth quarter of FY96 and two in the second quarter FY97.

Kill Assessment. This program is developing the technical basis for the TMD architecture battle management decision kill assessment capability. This capability will enable the battle manager to respond nearly real time following a target intercept engagement to cease-fire, to order a second shot, or to cue the lower tier for appropriate action. This kill assessment capability will also help measure defense system effectiveness and identify threat warhead type. In support of this shoot-look-shoot doctrine, the program is conducting a series of specialized sensor data collections of TMD interceptor tests, follow-on data analysis, and algorithm development. The most challenging

aspect is gathering enough pertinent data from various types of intercept scenes to identify and evaluate those observable characteristics serving this decision process. Since opportunities to observe actual TMD missile intercepts are rare, this program will emphasize ground test measurements and construction of analytical models and tools for developing and validating algorithms for the TMD acquisition program.

TMD Seeker Test/Measurements: This program provides for the application, integration, and testing of the latest available seeker technologies into on-going TMD seeker designs. The program is divided into two parts; the first supports the Seeker Experimental System (SES) which is used to evaluate missile seeker performance functions and the second is a seeker window sapphire material characterization effort designed to provide a critical database for designers to evaluate seeker window performance in the high temperature, low altitude flight regime. The SES provides BMDO with independent evaluation of emerging seeker technologies in a realistic system context, allowing for risk assessment prior to acquisition commitment. In supporting the solution of technical problems arising in seeker acquisition programs, the SES can address a wide range of design and implementation issues such as hardware/software integration and evaluation of seeker functional algorithms. The sapphire material test activities serve as risk mitigation for Theater High Altitude Area Defense (THAAD), Navy Standard Block IVA Missile and the Arrow Programs for improved survivability confidence of the seeker window.

Target Signature Measurements. This program funds the per mission costs to acquire data using sophisticated sensor platforms (Airborne Surveillance Testbed, HALO, Sealite Beam Director, etc.) on BMDO interceptor target flights (LANCE, STORM, Hera, etc.). This program also provides the tasking through the Target Signatures Working Group (TSWG) and the funding for each mission to the sensor platforms for each flight. The data collected is utilized by the acquisition programs, the TSWG, and the Targets Program to establish target in-flight signature characteristics for use in hardware development and interceptor algorithm assessment.

SSCARR is a joint effort involving the THAAD, Navy SM Block IVA, and Arrow programs. Due to its mechanical strength, high thermal conductivity, and high transparency in the mid-wave infrared, sapphire has become the material of choice for TMD seeker windows and domes. SSCARR employs statistical procedures to determine window/dome reliability for the participating programs. This probability of failure data will allow designers and battle planners to more fully exploit the interceptors' available battlespace. In addition, diagnostic techniques are being used in an attempt to demonstrate correlation's between sapphire surface and volume features and "weak" sapphire, thus providing a sapphire screening technique. Potential follow-on activities to SSCARR include a computational fluid dynamics validation effort with emphasis on problems relating to predicting jet interaction effects, an assessment of advanced seeker window technology to remove blur where extreme accuracy in angle-rate measures are required, and an investigation of the utility of reactive materials on hit-to-kill interceptors.

PROJECT NUMBER: 1262
PROJECT TITLE: Corps SAM/MEADS Concepts
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	FY98	FY99
0603869C RDT&E	56,232	47,956	9,509

PROJECT DESCRIPTION:

The Corps SAM/Medium Extended Air Defense System (MEADS) is an advanced air and missile defense system. Corps SAM/MEADS is designed to fill a critical void providing highly mobile defense of maneuver forces from ballistic and cruise missiles and Unmanned Aerial Vehicles (UAVs). In May 1996 the Memorandum of Understanding (MOU) among the U.S., Germany, and Italy was signed. Subsequently, in June 1996, the Charter for the North Atlantic Treaty Organization (NATO) MEADS Design and Development, Production, and Logistics Management Organization (NAMEADSMO) was approved. In accordance with these directives, the NATO MEADS Management Agency (NAMEADSMA) is responsible for the accomplishment of the Project Definition/Validation Phase (PD/V). The objective of the PD/V Phase is (1) to define and validate through engineering analyses, simulations and demonstrations a MEADS which is compliant with the commonly agreed requirements of the Participants, while taking maximum advantage of the technology existing in the countries of the Participants and (2) to define a balanced cooperative Program to develop, produce in single source and support MEADS which has acceptable technical and financial risks for the Participants. The Corps SAM/MEADS National Product Office has also been established and will be responsible for planning, budgeting, and coordinating all U.S. national efforts in support of the MEADS program as well as executing national specific tasks related to satisfying the Corps SAM requirements.

The Corps SAM/MEADS mission and consequently its design is a function of the assets that Corps SAM/MEADS must protect, the threat against these assets, and the depth and nature of the battlefield. Corps SAM/MEADS will be designed to deal with shorter range Tactical Ballistic Missiles (TBMs), cruise missiles, UAVs, and other air breathing threats. It will be required to protect critical maneuver force assets throughout all phases of tactical operations and it will be operating in the division area of the battlefield outside the umbrella of an upper tier system. Corps SAM/MEADS will be designed to provide: (1) defense against multiple and simultaneous attacks by Short Range Ballistic Missiles (SRBMs), low cross-section cruise missiles, and other air-breathing threats to the force; (2) immediate deployment for early entry operations with as few as six C-141 sorties; (3) mobility to move rapidly and protect maneuver force assets during offensive operations; (4) a distributed architecture and modular components to increase survivability and flexibility of employment in a number of operational configurations; and (5) a significant increase in firepower while greatly reducing manpower and logistics requirements. Given these characteristics, Corps SAM/MEADS will be able to rapidly respond to a variety of crisis situations and satisfy the needs of the joint operational and tactical commanders.

PROJECT NUMBER: 1266
PROJECT TITLE: Navy Theater Wide MD (Upper Tier)
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	FY98	FY99
0603868C RDT&E	304,171	194,898	192,073

PROJECT DESCRIPTION:
The Navy Theater Wide (NTW) Ballistic Missile Defense (BMD) program builds upon the Navy Area Theater Missile Defense (TMD) program and the national investment in AEGIS ships, weapons systems, and missiles. Two classes of ships are deployed with the AEGIS combat system: the Ticonderoga Class cruisers and the Arleigh Burke Class destroyers. Navy Theater Wide BMD will take advantage key naval forces attributes including overseas presence, mobility, flexibility, and sustainability to provide protection of a theater of operations.

The Navy Theater Wide BMD program will provide an exoatmospheric naval regional defense capability to counter the TBM threat. In accordance with the BMD Program Review in early 1996, the Navy Theater Wide program is conducting the following activities: an AEGIS LEAP system level intercept demonstration, Kinetic Warhead (KW) technology assessments and concept definition studies, and system engineering efforts to identify key technical risk reduction activities including discrimination and KW lethality. Since the FY97 President's Budget request, the Department has provided additional funds for FY98-01 to increase testing and conduct more in-depth risk reduction. Ongoing advanced technology studies provide the anticipated objective system improvements required to meet the evolving threat.

This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy.

PROJECT NUMBER: 1270
PROJECT TITLE: Advanced Interceptor Materials and Systems Technology
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0603173C RDT&E	68,409	31,492	29,412

PROJECT DESCRIPIION:
To prepare for critical future defense needs, advanced technology programs will invest in a balanced program of high leverage technologies that yield improved capabilities at affordable cost with lower technical and schedule risks for boost phase and terminal missile defense interceptors, advanced target sensors and future space surveillance and defense systems. The objectives of these investments are component and systems technologies with improved performance and reduced costs for acquisition programs, and technical solution options to mitigate advanced and unpredicted threats.

The Advanced Interceptor Materials and Systems Technology (AIMST) program develops and demonstrates the following for interceptor and space surveillance systems: advanced interceptor sensor processing and power components; multifunctional material and structures; low cost interceptor composite manufacturing processes; and low cost flight test demonstrations. These technologies are critical to the deployment of effective, affordable TMD and NMD systems.

The near term AIMST projects are planned and executed through direct interchange with System Program Offices (SPOs) and prime contractors responsible for fielding current NMD Technology

Readiness and TMD systems hardware. The execution of this comprehensive technology program, however, is slowed by funding limitations. This impedes efforts on near term technologies that will increase interceptor and sensor performance while lowering deployment costs.

The AIMST program consists of six major task programs: Discriminator Interceptor Technology, Materials and Structures, Power Technology, Endoatmospheric Flight Experiment (EFEX), the Space Technology Research Vehicle (STRV), and the Atmospheric Interceptor Technology (AIT) programs.

Discriminator Interceptor Technology Program: The Discriminator Interceptor Technology Program (DITP) develops subsystems necessary to achieve long range threat acquisition and tracking, accurate homing guidance, robust discrimination, and aim point selection for autonomous hit-to-kill interceptors. Passive infrared sensors, and laser radars (LADARs) are being designed, fabricated, and tested. Emphasis is placed on increasing active sensor output power, miniaturization, and ladar waveform generation to support onboard imaging. The primary goal of the DITP program is interceptor flight demonstrations of the integrated sensor suite, with its data fusion processor and associated discrimination/data fusion algorithms, to demonstrate the performance and readiness of the advanced subsystems to support future form-fit-function upgrades to NMD and TMD interceptors.

The Materials and Structures Program: The materials and structures program develops and demonstrates: advanced, low cost to manufacture, multifunctional, composite structural components; adaptive and passive vibration isolation and suppression systems; optical materials and baffle specialty components; and low temperature superconductor LWIR sensor electronics. This program also evaluates new high temperature, composite materials for use in manufacturing propulsion components such as ceramic hot gas lines, combustion chambers, nozzles, and exit cones. Many projects executed under the Materials and Structures Task, which includes the EFEX and STRV programs, rely on cofunding from other agencies (AF, USA, DARPA, NASA) or international partners (U.K., Japan). In some cases this cooperative funding represents a substantial portion of the total project cost. Reductions in current or future cooperative funding will adversely impact planned goals and schedules.

Power Technology Program: The power program develops concentrator solar arrays (SCARLET); electric generators, thermal management components, and power conditioning for GBR; and batteries for TMD and NMD interceptors. The technologies will improve system performance in terms of reducing recurring costs, lowering mass and increasing efficiency.

Endoatmospheric Flight Experiment (EFEX) Program: This multiflight test program will use existing sounding rockets to provide the hypersonic flight environment to validate advanced interceptor technologies. Lightweight, ultrastiff, high temperature, multifunctional structures, optical and structural thermal control concepts, super-tough optical windows and erosion resistant coatings, emergent processing and guidance schemes, miniature inertial systems, advanced shroud concepts, propulsion systems, and dual mode seekers and aperture will be tested. The flight test results will be correlated with aerothermal-mechanical test results from ground-based hypersonic and shock tube facilities in the 3 to 4 km/sec velocity and 20 km to 45 km altitude range. Subsequent tests will emphasize high-g maneuverable flight profiles.

Space Technology Research Vehicle Program (STRV-1c/d, STRV-2 and STRV-3): The STRV-2 Experiment Module will consist of an advanced composite structure supporting the following 6 primary payloads: (1) a U.K. provided Mid-Wavelength Infrared (MWIR) experiment; (2) the Vibration Isolation Suppression System (VISS); (3) the Space Active Modular Materials Experiment System (SAMMES); (4) the Electronic Test Bed (ETB); (5) the Laser Communications Experiment (Lasercom); and (6) the Micro-Meteoroid And Debris (MM&D) experiment. The low outgassing, high stiffness and high strength composite structure is part of the overall experiment providing critical validation for incorporation of this technology in future systems. Multiple sensors will be used to measure local contamination from all sources, including the composites used in structures. The primary payloads form an overall integrated payload. MWIR background/clutter data will be obtained using filters specified by the Space and Missile Tracking System (SMTS) SPO. Data on the space environment at SMTS mission altitudes and its effects on materials, components and systems will be obtained. A one year mission is planned. Efforts have been initiated to conduct follow-on cooperative space experiments with the U.K. using micro satellites based on the recent U.S./U.K. STRV 1a/b program. These U.K.-provided micro satellites (STRV 1c/d) have a nominal launch planned for FY99. The experiments to be flown on STRV 1c/d include a Quantum Well Infrared Photometer (QWIP) sensor and a multifunctional composite structure. The Space Technology Research Vehicle-3 (STRV-3) will be a U.S.-led multiagency, multinational (U.K., U.S. allies) cooperative space experiment effort. The program is in the preliminary discussion stage.

Atmospheric Interceptor Technology (AIT) Program: The AIT program will develop, integrate and demonstrate the critical technologies for performing hypersonic hit-to-kill intercepts of TBMs within the atmosphere. The demonstrations will validate the solution to critical KKV technologies and will provide: (1) new capabilities with reduced costs/risks compared to current interceptor weapons systems, and enhancements to other interceptors under development; (2) reduction of technical risks and costs in support of acquisition programs through direct technology insertions; and (3) technical solutions to provide theater defense interceptor capabilities for contingencies not currently addressed by the TMD system programs. The program uses existing contracts and technologies currently under development to reduce schedule and cost, and will be planned and conducted with BMDO, Air Force, Navy, and Army elements to make maximum use of existing Service infrastructures. The AIT project will participate in the UAV/BPI Studies (PMA 1294) and the Navy Theater Wide requirements studies.

PROJECT NUMBER: 1294
PROJECT TITLE: UAV Boost Phase Intercept
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0603870C RDT&E	23,276	12,885	0
0603872C RDT&E	930	0	0

PROJECT DESCRIPTION:
The Unmanned Aerial Vehicle (UAV)-Based Boost Phase Intercept (BPI) project covers two tasks; Task 1: Cooperative UAV-Based BPI project with Israel, and Task 2: Development of a U.S. UAV-Based BPI Concept. Task 1 is a cooperative U.S./Government of Israel (GOI) BPI program which involves future development and refinement (risk mitigation) of the Israeli Boost

Phase Intercept System (IBIS) concept which is planned to destroy tactical ballistic missiles in the boost phase of flight, before engine cutoff, preferably while in enemy territory. This project is based on the use of UAVs armed with onboard interceptors to provide the means of destroying enemy missiles in their boosting phase of flight. The first task of this two-part project will provide risk mitigation in the development of the GOI's UAV BPI. Task 2 of this effort develops a U.S. UAV-based BPI system concept. It will develop the system requirements, to include: kinetic energy interceptors, UAVs, search and track sensors, Battle Management, Command, Control, Communications, Computers and Intelligence (BM/C^4I), and the concept of operations (CONOPS) based on readily available U.S. technologies.

PROJECT NUMBER: 1360
PROJECT TITLE: Directed Energy Programs
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0603173C RDT&E	95,930	28,877	28,539

PROJECT DESCRIPTION:
BMDO's charter is to provide for defense against current and future missile threats. An effective missile defense against a wide variety of current and near term projected threats will require boost phase intercept capability. The Space Based Laser (SBL) program was created to provide the nation with a highly effective, continuous, global boost phase intercept option for both theater and national missile defense. While BMDO is pursuing numerous terminal and midcourse intercept concepts, this program element, project number 1360, contains DoD's only boost phase intercept program that can provide national missile defense and operate in all theaters, regardless of size, geometry, or weather conditions. This system also provides many ancillary capabilities, including air defense, global surveillance and target detection and designation for other systems.

Unique features of an SBL missile defense system include global, 24 hour boost phase intercept capability and defense against surprise first strikes. SBLs can destroy missiles whose range is greater than 75 miles, providing a robust first layer for both theater and national missile defenses-in-depth. SBLs do not require prior knowledge of enemy launch site locations. The footprint of one SBL can cover approximately 10% of the earth. Twenty SBLs could provide overlapping full-time coverage of missile threats from theaters anywhere. Each SBL would be capable of destroying approximately 100 missiles with the initial fuel load. Capability for on-orbit refueling would be provided. An SBL system could defend against missiles without putting the lives of U.S. military personnel at risk. With its long range and speed of light defense, it accomplishes boost phase intercept at the earliest possible moment, offering the highest probability that intercepted missile fragments (possibly containing active chemical/biological or nuclear materials) will fall within the attackers territory, not on defended assets.

The Directed Energy Program is structured to address the key critical technical issues: (1) Can a chemical laser be built powerful enough to destroy a missile at militarily useful ranges? (Alpha program); (2) Can mirrors and optics be built large enough and easily enough? (Large Aperture Mirror Program (LAMP) and Large Optical Segment (LOS)); (3) Can the high-power beam be controlled adequately? (Large Optics Demonstration Experiment, LODE); (4) Can the high-

power components of a Space Based Laser be integrated on the ground and operated as a system? (Alpha LAMP Integration (ALI)); (5) Can missile targets be acquired and tracked from space and can a laser be pointed and fired accurately enough? (Acquisition, Tracking, Pointing, and Fire Control, ATP/FC); (6) Can these key components be integrated into a functional unit suitable for space flight and remote operation? (Space Based Laser Readiness Demonstrator (SBLRD) Ground Demonstration); and (7) Can the fully integrated system operate adequately on-orbit? (SBLRD).

Progress To Date. The program has demonstrated that the answer to questions 1 through 3 (and partially 5) is "yes," and has built devices that perform the respective functions. (1) The Alpha program's high energy chemical laser achieved weapons-class power for the first time in 1991. (2) LAMP and LOS demonstrated the ability to build optics of the required size with the successful fabrication of a 4-meter segmented mirror in 1989 and a key segment of an 11 meter mirror in 1993. (3) The Large Optics Demonstration Experiment (LODE) demonstrated the ability to control the projected (or outgoing) beam in low power laser experiments in 1987. (5) The basic technology of acquiring and tracking missiles and pointing a high-power laser beam from ground and space has been demonstrated by a number of programs. The ATP/FC technologies required (sensors, optics, processors, etc.) have been demonstrated at or near performance levels required for the Space Based Laser. Stable low power laser beam pointing from a space platform was demonstrated at the same precision level required for an operational SBL in 1991 during the flight of the Relay Mirror Experiment (RME).

Current Status. The major building blocks have been developed, but key system integrations and tests lie ahead. Remaining tasks are: to integrate the high-power laser with the large optics beam director and test (Alpha-LAMP Integration (ALI)); to integrate and test ATP/FC hardware and software (High Altitude Balloon Experiment (HABE)); to integrate the high-power laser and the large optics beam director hardware with ATP/FC hardware and test; to integrate the system in a space qualified SBL Readiness Demonstrator (SBLRD) vehicle for ground and flight testing.

In FY96, Congress provided additional program funding to continue ALI, accelerate design activities for a space demonstration, produce a Concept Of Operations (CONOPS) and design requirements for an operational SBL system, and revitalize the SBL technology development efforts. The increased funding allowed us to preserve vital infrastructure, restore the ALI program to its original scope, and continue the ATP/FC program.

PROJECT NUMBER: 1651
PROJECT TITLE: Innovative Science and Technology
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0602173C RDT&E	56,009	50,923	50,094
0603173C RDT&E	2,233	0	0

PROJECT DESCRIPIION:

To prepare to meet critical future active defense needs, advanced technology programs invest in an aggressive program of high leverage technologies that yield markedly improved capabilities across a selected range of boost phase and terminal defense interceptors, advanced target sensors, and innovative science. The objectives of these investments are to provide: (1) component technologies that offer improved performance or reduced costs for BMDO acquisition programs; (2) a better understanding of the physical processes to support these acquisition programs; and (3) technical solution options to mitigate unpredicted threats. Unlike other BMDO projects that fund near term technology and testing efforts, this advanced technology initiative invests seed money in high-risk technologies that could significantly change how BMDO develops future systems. The technologies pursued include: next generation sensors, power, information processing, optics, advanced materials, propulsion and communication. This project causes and exploits breakthroughs in science that will keep BMD at the foremost edge of what is possible. A primary project goal is to conduct proof-of-concept demonstrations that transition technology to development programs.

Many of today's baseline technologies on BMDO systems like Theater High Altitude Area Defense (THAAD), PATRIOT Advanced Capability (PAC-3), and Ground Based Radar (GBR) are available due to the wise investment in innovative technologies some 10 years ago. Examples include: indium antimonide and mercury cadmium telluride ultrasensitive infrared detectors; 32-bit radiation hardened Reduced Instruction Set Computer (RISC) processors for image analysis; composite materials for lightweight satellite structures; interferometric fiber-optic gyroscopes for sophisticated guidance and control; and solid-state gallium arsenide transmitter/receivers for BMDO radars. The IST program is the only R&D program in the Defense Department focused on future BMDO technical requirements.

PROJECT NUMBER: 1660
PROJECT TITLE: Statutory and Mandated Programs
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0602173C RDT&E	46,501	51,009	45,394
0603173C RDT&E	4,707	4,161	4,113

PROJECT DESCRIPIION:

To prepare for critical future missile defense needs, advanced technology programs will invest in a balanced program of high leverage technologies that yield improved capabilities across a selected range of boost phase and terminal missile defense interceptors, advanced target sensors, and innovative science. The objectives of these investments are component technologies with improved performance or reduced costs for acquisition programs, and technical solution options to mitigate advanced and unpredicted threats.

Two specific programs in advanced technology are managed under this project:

1. Technology Applications
2. Historically Black Colleges and Universities/Minority Institutions (HBCU/MIs)

The Technology Applications Program, established in 1986, makes technology from all parts of BMDO available to federal agencies, state and local governments, and U.S. business and research interests. The program objective is to develop and support the transfer of BMD derived technology to other Department of Defense applications as well as other federal, state and local government agencies, federal laboratories, universities, and the domestic, commercial, and private sector. Incorporation of these technologies by the private sector and other government agencies can result in reduced unit costs and further improvements to be made available for applications in BMDO systems.

The HBCU/MI Program increases and improves the participation of minority colleges and institutions in the BMDO program. It also responds to Section 832 of PL 101-510 which establishes a specific goal for HBCU and MIs within the overall five percent goal for minority business contracts and introduces them to BMDO technologies and the particulars of the BMDO procurement process.

Each program will focus, to the maximum extent feasible, on innovative technologies in support of future BMD sensor and interceptor systems. These systems will require processing, sensor, power, propulsion, materials and BM/C^3 capabilities beyond those currently being developed. An important goal of each program is to identify, develop, and demonstrate innovative technologies which will dramatically improve BMD system performance.

PROJECT NUMBER: 2160
PROJECT TITLE: TMD Existing System Modifications
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0603872C RDT&E	22,421	12,328	12,957

PROJECT DESCRIPIION:
This project implements nonmajor defense acquisition program modifications to current and existing warning and surveillance systems that result in fielded improvements to TMD capabilities. This project consists of three programs: Cueing and Netting, SHIELD, and the Extended Airborne Global Launch Evaluator (EAGLE).

CUEING AND NETTING. The overarching objective of the cueing and netting task is to enable the U.S. Marine Corps AN/TPS-59 long-range surveillance radar to accept external cues from, and pass cues to, different theater sensors in order to facilitate Theater Ballistic Missile (TBM) identification, location, and tracking. The effort will consist of the development, testing, and operational demonstration of hardware and software improvements to the radar and other supporting systems.

SHIELD (Formerly Talon Shield). The SHIELD program is developing a system that receives and fuses Defense Support Program (DSP) assets, other national intelligence data and SIGINT data on Theater Ballistic Missile (TBM) events to provide more timely warning of worldwide

TBM launch point, time, azimuth and impact point prediction to tactical units. As processing improvements and additional sources are integrated and fused, these upgraded capabilities are passed to the Air Force Attack and Launch Early Reporting to Theater (ALERT) and the Army Joint Tactical Ground Station (JTAGS) programs for incorporation in the operational systems. The system is collocated at the Joint National Test Facility, Falcon Air Force Base, CO with ALERT.

Extended Airborne Global Launch Evaluator (EAGLE). The EAGLE is a Commercial Off The Shelf (COTS) and Nondevelopmental Item (NDI) program that will field a detection, tracking, and cueing system against TBM. EAGLE will be compatible with any Boeing 707 type or larger class aircraft. The prototype is currently planned for installation in the Air Force E-3 Airborne Warning and Control System (AWACS) aircraft. EAGLE represents the integration of several existing technologies into a new sensor suite that will add significant leverage to the overall TBM defense architecture as well as provide significant complementary support to the U.S. and NATO AWACS missions. The principal components of EAGLE are a Wide Area Surveillance Sensor (WASS) from the B-1B program, a High Accuracy Reacquisition Sensor (HARS) from the F-117A Nighthawk program, and a laser range finder from the Navy's Radiant Mist/Outlaw projects. The overall integrator and prime contractor is Boeing in Seattle, Washington. The major subcontractors are Texas Instruments in Dallas, Texas and Rockwell International of California. International participation is at the second tier subcontractors. Operationally, the EAGLE system will acquire a boosting TBM and track it until shortly after burnout to establish very precise trajectory, launch point, and impact point estimates. This information will be broadcast as a Joint Tactical Information Distribution System (JTIDS) message which will be used to cue active defense radar, support attack operations against the launchers, and provide improved warning for passive defense. The trajectory cue will enable fire control radar from a variety of interceptor systems to efficiently focus their energy into a single beam allowing acquisition much sooner than normally achievable with autonomous operations. This capability maximizes the defended area footprint as required by the Joint Requirements Oversight Council (JROC). EAGLE can greatly improve the defended area against long range theater ballistic missiles versus autonomous operation. In addition, the improved situational awareness provided through BM/C^3I to the Joint Force Air Component Commander greatly enhances the coordination of the theater air battle and ballistic missile defenses.

FY97 Congressional Language mandated that funding be moved from “TMD Existing Systems - EAGLE” to “Airborne Sensor for Ballistic Missile Tracking”. The language also directed the Under Secretary of Defense for Acquisition and Technology (USD(A&T)) provide a plan to congressional defense committees for developing an airborne sensor capability for ballistic missile tracking not later than 19 Jan 97. The language directed that operational user requirements and perspectives and total program cost be given priority consideration in selecting a system to provide this capability. To meet this mandate, the FY97 funds for Task 3 - EAGLE was moved to Task 4 - Airborne Sensor for Ballistic Missile Tracking, the report to Congress written, and program plan developed for the chosen airborne sensor. The EAGLE program will be allowed to proceed at a slower pace due to the funding limitation while the study is conducted and the report written. The Rivet Joint Technology Transfer program will be given initially $400,000 to participate in the study. Depending on the USD(A&T) decision, an airborne sensor may be chosen to proceed through Engineering, Manufacturing, and Development (EMD) and production.

PROJECT NUMBER: 2257
PROJECT TITLE: PATRIOT Advanced Capability-3
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	FY98	FY99
0208865C PROC	219,413	0	0
0604865C RDT&E	381,092	206,057	101,430

PROJECT DESCRIPTION:
PATRIOT is a long-range, mobile, field Army and Corps air defense system, which uses guided missiles to simultaneously engage and destroy multiple targets at varying ranges. The PATRIOT Advanced Capability Level-3 (PAC-3) Upgrade Program is the latest evolution of the phased material change improvement program to PATRIOT. The material changes will provide improved performance across the spectrum for system and threat intercept performance. The material changes include a new PAC-3 missile (previously known as ERINT), remote launch capabilities, communications and computer/software improvements, and radar upgrades to enhance system performance by improving its multifunction capability for tracking, and target handling capability against air breathing, ballistic and cruise missile threats. The PATRIOT operates as lower tier of the Army's Theater Missile Defense (TMD) task force and is developing the capacity to interact with the Navy Cooperative Engagement Capability (CEC) system. PATRIOT is pursuing integration of PATRIOT BM/C^3I with the Project Manager, Air Defense Command and Control Systems to take advantage of previous Army developments that can be incorporated into the PATRIOT program.

PROJECT NUMBER: 2259
PROJECT TITLE: Israeli Cooperative Project
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	FY98	FY99
0603872C RDT&E	43,892	38,715	38,662

PROJECT DESCRIPTION:
This project includes the Arrow Continuation Experiments (ACES) Project, the Arrow Deployability Project (ADP), the Israeli Test Bed (ITB), Israeli Cooperative Research & Development (R&D), and the Israeli System Architecture and Integration (ISA&I) Project. The United States derives considerable benefits from its participation in these projects. The primary benefits are in U.S. gains in technology and technical information that will reduce risks in U.S. TMD development programs. The United States also benefits from the eventual presence of an anti-ballistic missile defense system in Israel, which provides deterrence of future tactical ballistic missile (TBM) conflicts in that region. This defensive system also contributes to a more robust defensive response should deterrence fail.

The Israeli Arrow program consists of efforts to develop a ballistic missile defense system. It includes the U.S.-Government of Israel (GOI) initiative to assist the GOI development of an anti-

tactical ballistic missile (ATBM) interceptor and launcher. The program also includes development of the fire control radar, fire control center and launch control center by the Israelis without U.S. participation. Comprised of three phases, this initiative began with the Arrow Experiments project (Phase I) that developed the preprototype Arrow I interceptor. The ACES project (Phase II) is a continuation of Phase I, and consists of critical lethality tests using the Arrow II interceptor upgraded development and test of the Arrow II interceptor. Arrow provides the basis for an informed GOI engineering and manufacturing decision for an ATBM defense capability. If successful, the Arrow II will satisfy the Israeli requirement for an interceptor for defense of military assets and population centers and will support U.S. technology base requirements for new advanced anti-tactical ballistic missile technologies that could be incorporated into the U.S. Theater Missile Defense (TMD) systems.

The third phase is the ADP which began in FY96. This phase of the project will pursue the research and development of technologies associated with the deployment of the Arrow Weapon System (AWS) and will permit the GOI to make a decision regarding deployment (without financial participation by the United States beyond the R&D stage). This effort will include system-level flight tests of the U.S.-Israeli cooperatively developed Arrow II interceptor supported by the Israeli-developed fire control radar, fire control center and Launcher Control Center (LCC). An interface will be developed for AWS interoperability with U.S. TMD systems. Lethality, kill assessment and producibility will continue to be assessed. Subsequent U.S.-Israeli cooperative R&D on other ballistic missile defense concepts may occur in the future.

The ITB Program is a medium-to-high fidelity theater missile defense simulation that provides the capability to evaluate potential Israeli missile defenses, aids the Israeli Ministry of Defense (IMoD) in the decision of which defense systems to field, provides insights into command and control in TMD, and trains personnel to function in a TMD environment. A structured set of joint U.S./Israeli experiments is being executed to evaluate the role of missile defenses in both mature and contingency Middle East theater operations. This funding also provides for a portion of the operation and maintenance of the ITB and for planned enhancements. Completed experiments identified additional enhancements needed to improve the ITB as an analysis tool. The enhancements incorporated in the ITB to date include radar and weapons models, and a BPI simulation capability. The BPI enhancement benefited the Israeli BPI study completed in January 1996. The planned Adaptive Battle Management Center (ABMC) enhancement will benefit the United States by enabling the ITB to simulate a wide variety of command and control and interoperability issues.

The Israeli Cooperative R&D program supports the advancement of emerging TMD technologies. This support will advance the technology demonstration phase which will provide for the defense of the State of Israel. It further supports the U.S. technology base needs for these technologies, and furthers the pursuit of interoperability with U.S. TBMD systems. This task supports efforts in developing an interface to allow for interoperability between Israeli TMD systems and U.S. TBMD systems and the implementation of such a system.

The ISA&I tasks provide ongoing analysis and assessment of the baseline, evolutionary, and responsive threats to support the definition and evaluation of an initial Israeli Reference Missile Architecture (IRMA), a baseline missile configuration. Evolutionary growth paths to enhance the IRMA robustness against future threats will be identified. Critical TMD system architecture issues and technologies will be analyzed, and the conformance to established requirements of var-

ious Israeli Anti-tactical Ballistic Missile (ATBM) programs, including the Arrow missile development activity, the ADP, and the ITB will be conducted. Finally, previously developed simulations and models will be used selectively to address significant TMD issues. Collectively, the tasks conducted under this cooperatively sponsored ISA&I project will provide critical insights and technical data to both the U.S. and Israeli governments for improving near term and evolutionary defenses against ballistic missile threats.

Since program initiation in 1988, Israel successfully improved the performance of its pre-prototype Arrow I interceptor to the point that it achieved a successful intercept and target destruction in June 1994. Arrow II design and component testing progressed to the successful demonstration of the new warhead, electro-optical seeker, radar fuse, first stage booster, sustainer booster, launcher canister, and launcher. The ADP International Agreement was signed in March 1996 and Presidential certification was completed in May 1996.

The ITB became operational in the second quarter of FY92. The ITB experiments validated the performance of the prospective near term Israel Theater Missile Defense System. It provided valuable insight into the potential role of Human-In-The-Loop (HIL) for a TMD system. Also, the Test bed Product Office at the Space and Strategic Defense Command benefited from the application of ITB Project experience to the U.S. and United Kingdom Extended Air Defense Test Bed (EADTB) Projects.

The ISA&I Project activities demonstrated that defense of the State of Israel from tactical ballistic missile (TBM) attacks is feasible and cost-effective. The ISA&I effort analyzed and addressed numerous TMD system issues including HIL, resource allocation, and threat analysis. The United States benefited from the architecture analysis work, including identification and progress toward resolution of critical TMD system issues such as kill assessment and the lethality study of a novel interceptor warhead.

PROJECT NUMBER: 2260
PROJECT TITLE: THAAD System
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0603861C RDT&E	341,307	294,647	16,778
0604861C RDT&E	277,508	261,480	578,467
0604861C MILCON	0	4,565	0

PROJECT DESCRIPTION:
The Theater High Altitude Area Defense (THAAD) System is being designed to negate theater ballistic missiles (TBM) at long ranges and high altitudes. Its long-range intercept capability will make possible the protection of broad areas, dispersed assets, and population centers against TBM attacks. The THAAD System includes missiles, Palletized Loading System (PLS) launchers, Battle Management/Command, Control, Communications, Computers, Intelligence (BM/C^4I) units, THAAD Radars, and support equipment. The THAAD Radar (formerly known as Ground Based Radar) provides threat early warning, threat type classification, interceptor fire control, external sensor cueing, and launch and impact point estimates for the THAAD System. The THAAD

Radar is based on state-of-the-art, solid-state, X-band radar technology. THAAD will be interoperable with both existing and future air defense systems. This netted and distributed BM/C^4I architecture will provide robust protection against the TBM threat spectrum. THAAD is pursuing integration of THAAD BM/C^4I with the Project Manager (PM), Air Defense Command and Control Systems (ADCCS) to take advantage of previous Army developments that can be incorporated into the THAAD program.

The Demonstration/Validation (Dem/Val) program will develop a design for the objective THAAD system and demonstrate the capabilities of the system in a series of 11 flight tests. The residual hardware resulting from the THAAD Dem/Val program, including the User Operational Evaluation System (UOES) missile option, will be used for a prototype system called the UOES. The UOES, used primarily for early operational assessment and for soldiers to influence the final design, will also be available for limited use as a contingency capability during a national emergency. The UOES will consist of 40 missiles with 4 launchers, 2 BM/C^4I units, 2 THAAD Radars and support equipment. The THAAD system design will be developed and tested in the Engineering, Manufacturing, and Development (EMD) phase leading to low rate initial production and subsequent fielding in FY04.

During FY95-98 the Dem/Val flight test program will be conducted at White Sands Missile Range (WSMR), New Mexico. The flight test schedule consists of flight and system tests which began on April 21, 1995 with a successful first flight of the THAAD missile. To date, six flight tests have been conducted with the seventh flight planned for February 1997. The targets for the flight test program are being developed under the Tactical Missile Defense Targets contract (Project 3354).

This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy.

The THAAD Program continued Dem/Val hardware and software design, development and delivery in support of integration and acceptance testing for flight testing at WSMR. The first Dem/Val THAAD radar was delivered to WSMR on July 17, 1995, and has participated in flights 3, 4, 5, and 6. The THAAD Dem/Val Radar has performed in the shadow mode to the test range radar and will be the primary sensor on flight 7. The first UOES Radar was delivered to WSMR May 3, 1996, and completed range integration and test in September 1996. It will be used for flight testing beginning with flight 8 and for the remainder of the Dem/Val flight tests. The first flight was successfully conducted at WSMR on April 21, 1995, proving the THAAD missile propulsion system booster/kill vehicle separation, seeker shroud cover deployment, seeker data, uplink/downlink communications from the Radar Interface Unit (RIU) to the missile, and preplanned command destruct. The second flight was conducted on July 31, 1995, as a planned non-intercept, guidance and control test. The missile successfully performed the THAAD Energy Management Steering (TEMS) maneuver which resulted in nominal velocities and accelerations. The kill vehicle successfully maneuvered in response to planned In-Flight Target Updates (IFTUs). The third flight was a non-intercept fly-by test against a Storm target on October 13, 1995. The missile collected critical seeker data and the BM/C^4I generated the fire control solution and sent the launch command to the interim launcher. During flight 4, on December 13, 1995, much success was demonstrated even though a planned intercept was not accomplished. The PLS launcher was used successfully for the first time, and the seeker and integrated electronics package demonstrated end game homing. During flights 4, 5, and 6, the THAAD Radar successfully tracked both the

THAAD interceptor and the target. During flights 4 and 6, it properly maintained track on the interceptor and seeker shrouds during shroud separation. All radar mission events, times, and durations went as predicted in pre-mission analysis. Flight 6 was conducted July 15, 1996. Data analysis is being performed to assess the segment performance which all appeared to function as planned, with the exception of a component failure in the missile seeker. An intercept was not achieved, however, critical data was obtained on how the seeker viewed the target.

PROJECT NUMBER: 2263
PROJECT TITLE: Navy Area TMD (Lower Tier)
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0208867C PROC	9,151	0	0
0603867C RDT&E	59,315	0	0
0604867C RDT&E	241,330	267,822	226,748

PROJECT DESCRIPTION:
The Navy Area Theater Ballistic Missile Defense (TBMD) project builds on the national investment in AEGIS ships, weapon systems, and Navy Standard Missile II (SM-2) Block IV missiles. Two classes of ships continue to be deployed with the AEGIS combat system: the CG-47 Ticonderoga-class cruisers and the DDG-51 Burke-class destroyers. Navy TBMD will take advantage of the attributes of naval forces including overseas presence, mobility, flexibility, and sustainability in order to provide protection to debarkation ports, coastal airfields, amphibious objective areas, Allied forces ashore, and other high value sites. Navy assets will provide an option for initial TBMD allowing the insertion of additional land-based TBMD assets and other expeditionary forces in an opposed environment.

PROJECT NUMBER: 2358
PROJECT TITLE: HAWK System BM/C^3
PROGRAM ELEMENT/FUNDING ($ in Thousands)

	FY97	**FY98**	**FY99**
0208863C PROC	14,665	0	0

PROJECT DESCRIPTION:
The program consists of modifying the U.S. Marine Corps AN/TPS-59 long-range air surveillance radar and the HAWK weapon system to allow detection, tracking, and engagement of short-range TBMs and thereby provides a point defense Theater Missile Defense (TMD) capability to the Marine Air Ground Task Force. The program will also provide a communications interface between the AN/TPS-59 and the HAWK system by developing an Air Defense Communications Platform (ADCP). This Marine Corps TMD initiative is jointly funded with BMDO and will yield a low-risk, near-term capability for expeditionary forces against short-range ballistic missiles.

The AN/TPS-59 long-range surveillance radar is the primary sensor for the Marine Air Control Squadron. The (V3) configuration developed under this program was enhanced to provide a TBM tracking and surveillance capability. The radar completed operational test and evaluation in FY96 and initial modification kit production will begin in FY97. Installation of the modification kits is scheduled to begin in FY98 and complete in FY99.

The HAWK weapon system modifications include upgrades to the Battery Command Post (BCP) and improvements to the HAWK missile that resulted in a missile configuration called the "improved lethality missile." The modified HAWK BCP will process cueing data to control the high-power illuminator radar. The improved lethality missile will incorporate fuse and warhead improvements to 300 improved lethality missiles that have been transferred from the Army to the Marine Corps. Another 700 improved lethality missile modification kits will be procured and installed by the end of FY97. Production of the BCP modification kits began in FY95 and the installation of all BCP modifications was completed by the end of FY96.

The Air Defense Communications Platform (ADCP) will convert AN/TPS-59 data messages and Tactical Data Information Link-J (TADIL-J) formatted messages into the intra-battery data link formats required by the HAWK weapon system. The ADCP will also transmit TADIL-J formatted messages to other theater sensors. This communications interface has completed operational test and evaluation and initial production will begin in FY97. Fielding of the ADCP is scheduled to begin in FY98 and complete in FY99.

This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy.

PROJECT NUMBER: 2400
PROJECT TITLE: National Missile Defense
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0603871C RDT&E	828,864	504,091	393,085

PROJECT DESCRIPTION:
The objective of the National Missile Defense (NMD) program is to develop and maintain the option to deploy a cost effective, operationally effective, and Anti-Ballistic Missile (ABM) Treaty compliant system that will protect the United States against limited ballistic missile threats, including accidental or unauthorized launches or Third World threats. In mid 1993, the Department of Defense (DoD) conducted a Bottom-Up Review (BUR) to select the strategy, force structure, and modernization programs for America's defense in the post-Cold War era. With the dissolution of the Soviet Union, the threat to the U.S. homeland from a deliberate or accidental ballistic missile attack by states of the former Soviet Union (FSU) or the Peoples Republic of China (PRC) was judged to be highly unlikely. In addition, the ability of Third World countries to acquire or develop a long range ballistic missile capability in the near future was considered uncertain. As a prudent approach for responding to this uncertain threat, the Department pursued a technology readiness strategy for National Missile Defense (NMD) to develop and maintain the ability to deploy ballistic missile defenses for the United States should a threat emerge.

In February 1996, the Department completed a comprehensive Ballistic Missile Defense Program Review that addressed changes that have occurred in the ballistic missile defense environment since the 1993 BUR. For the NMD program, the findings of this review resulted in an adjustment to the goal of the NMD program and a corresponding adjustment to the Future Years Defense Program which now includes additional resources in FY96-98 for NMD. The revised goal of the NMD program is to develop, within three years, elements of an initial NMD system that could be deployed within three additional years after a deployment decision. This approach is commonly referred to as the NMD "3+3" program. The path towards accomplishing this goal includes: providing a near term focus to reduce program risk; providing a hedge against the potential of more sophisticated emerging threats; and conducting an integrated NMD system test not later than FY99. All development efforts will be broadly based to preserve deployment option flexibility for a future decision on deployment of an ABM treaty compliant NMD system.

To achieve this goal, BMDO has initiated an NMD Deployment Readiness Program. In April 1996 the USD(A&T) initiated steps to designate NMD as an Acquisition Category (ACAT) 1D program and in July 1996 the program successfully completed its first Overarching Integrated Product Team (OIPT) review. The intent of the NMD Deployment Readiness Program is to position the U.S. to respond to a strategic missile threat as it emerges by shifting emphasis from technology readiness to deployment readiness. This approach focuses on demonstrating an NMD system level capability by FY99, and being able to deploy that capability within an additional three years, if required to do so by the threat. If no threat materializes at the end of the three year development period, evolutionary development will continue on a path towards an objective system capability and the program will continue to maintain the ability to deploy within three years after a decision is made to do so. With this approach, no commitment to deploy is made until the threat emerges.

The NMD system is composed of several elements which are required to perform the key functions involved in a ballistic missile defense engagement. The Ground Based Radar (GBR) and the Space Based Infrared System (SBIRS) Low component (previously known as the Space and Missile Tracking System) provide the dual sensor phenomenology required to address the full spectrum of potential threats. In addition, Upgraded Early Warning Radars (UEWR) are candidate sensors in the event of an early NMD deployment within three years of the FY99 NMD integrated system test. SBIRS, which will provide midcourse tracking of targets, is currently managed and funded by the Air Force. The Ground Based Interceptor (GBI) is the weapon element that engages and destroys the threat. The Battle Management/Command, Control, and Communications (BM/C^3) element provides engagement planning and human-in-control management of the engagement.

Concurrent with the development of these elements, technology development efforts focused on achieving an early NMD capability and providing a path to future enhanced capabilities are being prioritized and funded to the extent possible. In addition, several related activities are being performed in support of the development of the NMD system. System Engineering develops the NMD system-level performance and integration requirements and flows these requirements down to the individual elements. NMD Integration activities integrate the individual elements into a unified and coordinated NMD system. Deployment Planning activities focus on the planning required to field the NMD system. Test and Evaluation activities provide management of the NMD T&E program. And Program Support provides overall program management and analysis support. All NMD activity areas are described in more detail below.

GBR is the primary fire control sensor, providing surveillance, acquisition, tracking, discrimination, fire control support and kill assessment for the NMD system. Prior to commitment of interceptors, the radar performs surveillance autonomously or as cued by SBIRS Low or other sensors, and will acquire, track, classify/identify and estimate trajectory parameters for targets. In post-commit, the radar will discriminate and track the target(s), and provide via the In-Flight Interceptor Communications System (IFICS) an In-Flight Target Update (IFTU) and a Target Object Map (TOM) to the interceptor(s). The GBR is an incremental development program derived from the former NMD-GBR program and will leverage the Theater Missile Defense GBR program to resolve the critical radar issues applicable to NMD. A GBR prototype, designated as GBR-P, will be installed at USAKA in FY98 and will be available as part of the FY99 NMD integrated system test (IFT-5).

Upgraded Early Warning Radars incorporate the software upgrades and modest hardware changes required by the existing Early Warning Radars to support the NMD mission. The UEWRs will detect, track and count the individual objects in a ballistic missile attack early in their trajectory. The UEWR data can be used for interceptor commit and GBR cueing in the event of an early deployment. Depending on the anticipated threat (East Coast or West Coast) at the time of a defense deployment decision, the appropriate BMEWS and/or PAVE PAWS radars will be upgraded for inclusion in the NMD architecture. If needed, other existing forward based radars (such as Cobra Dane or HAVE STARE) could also be used to support NMD.

The Ground Based Interceptor is using an evolutionary acquisition strategy to develop and demonstrate the NMD interceptor capability, with an emphasis on accomplishing the NMD integrated system test in FY99. The initial focus of GBI development is the Exoatmospheric Kill Vehicle (EKV) which is the most critical and technically challenging part of the GBI. Development of an EKV booster and the associated launch control equipment will begin in FY98. Until booster development is complete, EKV flight tests will be flown on the Payload Launch Vehicle (PLV), which is a booster consisting of a Minuteman II second and third stage. EKV sensor flight tests are scheduled for FY97 and EKV interceptor flight tests are scheduled for FY98 and FY99. The two current EKV contractors will be down selected to one in FY98.

The Battle Management, Command, Control And Communications activity uses an evolutionary approach to incrementally prototype the BM/C^3 functionality required for the NMD mission, and integrate and demonstrate an NMD system in step with evolving NMD sensors and interceptor element capabilities. BM/C^3 prototypes will be integrated and demonstrated at the Joint National Test Facility (JNTF) with USSPACECOM/NORAD user participation to refine and focus the BM/C^3 development and system behavior. NMD BM/C^3 supports the NMD command and control process required to provide human-in-control; develop, assess, and select missile defense strategies and tactics; fuse and correlate available sensor information for discrimination; integrate and plan the complimentary coordination of NMD sensors and interceptors for maximum system performance and kill assessment; provide interface with existing and planned C3 systems; prototype an In-flight Interceptor Communications System (IFICS) for BM/C3-GBI communication.

System Engineering translates user requirements into NMD system-level performance and integration requirements and flows them down to the individual program elements. This results in a balanced system capability, and readiness through incremental element development on a path to an objective system deployment capability. Throughout this process, systems engineering inter-

acts with and ultimately defines the architecture required to meet and defeat whatever the prescribed threat may be. System engineering is an integral part of the components performance verification, test planning and analysis, deployment planning, user concept of operations (CONOPS) development and evaluation, and command and control (C2) simulation analysis activities. This effort includes interaction with the user with respect to operational requirements, CONOPS, integration of multi-sensor systems, and operational evaluation of R&D activities in support of command and control (C2) simulations. Analyses, simulations, and tests are performed to address the system effectiveness and concept of operations of proposed NMD system architectures against near and far term ballistic missile threats. These results support activities required for strategic C2 simulations where the CINCs identify roles, missions and requirements for an effective NMD system.

NMD Integration activities focus on integrating the individual NMD elements into a cohesive NMD system. The Lead System Integrator (LSI) will have responsibility for integrating the GBI; developing, integrating and demonstrating the NMD system; and developing NMD deployment options. Parallel concept definition study contracts will be awarded in FY97, with down select and contract award to a single LSI contractor in FY98.

Deployment Planning activities focus on planning and logistics activities which support a decision to deploy, and the deployment of the NMD system if a deployment decision is made. The deployment planning effort will be captured in the NMD Integrated deployment Plan. Deployment planning activities also include the identification of critical actions and timelines for fielding the NMD system, the identification of actions that would mitigate the risks to deployment, and initial planning for life cycle logistics support. Other efforts include environmental analyses and documentation, site activation planning, human systems integration, site analyses, industrial base assessments and operational suitability assessments.

Test And Evaluation activities involve providing the planning and management to support the NMD test and evaluation program. Some test infrastructure is provided including the Integrated System Test Capability (ISTC) for NMD HWIL testing and simulation activities, and development and validation of targets for NMD sensor and EKV intercept tests. Planning includes overseeing the development and coordination of documentation essential to the conduct of testing -- the overall test strategy, the Cost Analysis Requirements Document (CARD), detailed test plans, interface control documents, lethality plans, posttest data analysis plans, and simulation Validation, Verification and Accreditation (VV&A). Management activities include development of the NMD Test and Evaluation Master Plan (TEMP), review and analysis of test results, and coordination of test assets.

Sensor Technology focuses on the development of advanced technologies in infrared focal planes, cryogenics, radiation hardened electronics and signal processing, and optics hardware for the objective SBIRS Low satellite system. Research and development of components, devices and subsystems required for the SBIRS Low system will continue, supportive technologies in infrared focal plane testing, cryocooler development and radiation testing of electronics and optics hardware will be pursued.

Program Support provides management and analysis support to the NMD programs in areas such as cost/schedule/performance assessments, cost estimating and analysis, budget analysis and for-

mulation, program planning and control, and contract management.

Other NMD Initiatives addresses the USAF NMD initiative to fully explore the USAF NMD concept, including utilizing test facilities which provide a realistic and representative test scenario. Specific activities remain under review but may include performing sensor track/data fusion, transmitting in-flight target updates and target object maps to an interceptor, acquiring targets with a sensor package, and demonstrating that the launch control system meets or exceeds NMD timeline requirements.

Phenomenology provides the U.S. with the capability to generate high confidence target signatures for ballistic missile defenses. This is a critical adjunct to the design and evaluation of NMD system performance across the full spectrum of threats and engagement scenarios. This program provides signature collection sensors for live-fire missions and storage of the resulting test data. This program provides predictive models of target signatures and develops algorithms for the critical functions of discrimination, target handover and aim point selection.

Architecture Analysis/BM/C^3 Initiatives supports an initiative to ensure that system architecture and BM/C^3 are addressed in a coordinated and synergistic manner across all NMD and TMD efforts. Systems analysis work is done to determine the expected operational effectiveness and life cycle cost impacts of the NMD system based on changing threats, mission requirements, acquisition reform initiatives and advances in technology. It includes implementation within BMDO of DoD initiatives in C4ISR architectures, technical architecture and open systems.

Threat And Countermeasures defines potential adversary missile forces which the NMD system could confront. This includes: (1) Intelligence threat description in the form of an annual report, the NMD System Threat Assessment (NMDSTA); (2) Threat scenario generation; and (3) Countermeasure integration, which integrates countermeasures (CM) technology into NMD elements.

Modeling And Simulation provides for the development and validation of modeling and simulation (M&S) tools and techniques. This project provides supercomputing resources at the Joint National Test Facility (JNTF) and the Advanced Research Center/Simulation Center (ARC/SC), and the engineering expertise and integration support to operate these facilities.

Test Resources provides the infrastructure to support the NMD test and evaluation program. Test infrastructure includes common test ranges and instrumentation, and common test beds for NMD HWIL testing and simulation activities. Common ground test facilities include: Kinetic Kill Vehicle Hardware-in-the-Loop Simulator (KHILS) at Eglin AFB, FL; Hypervelocity Wind Tunnel Number 9 at the Naval Surface Warfare Center, White Oak, MD; National Hover Test Facility (NHTF) at Edwards AFB, CA; Kinetic Energy Weapon Digital Emulation Center at Huntsville, AL; Aero Optic Evaluation Center (AOEC) at Calspan Corp, Buffalo, NY; Center for Research Support (CERES) at Falcon AFB, CO; Army Missile Optical Range (AMOR) at Huntsville, AL; 7V and 10V chambers at Arnold Engineering Development Center (AEDC) in Tullahoma, TN; Portable Optical Sensor Tester (POST) and Characterization of Low Background Mosiacs (CALM) at Rockwell International in Anaheim, CA; Naval Research and Development (NRaD) at the Naval Command, Control and Ocean Surveillance Center in San Diego, CA; and infrared and blackbody standards at the National Institute of Standards and Technology (NIST) in Gaithers-

burg, MD. Common range facilities include Kwajalein Missile Range (KMR) in the Marshall Islands; Western Test Range (WTR) at Vandenburg AFB, CA; and the Pacific Missile Range Facility (PMRF) at Kauai, HI. Common range instrumentation includes special test equipment, data collection assets and range instrumentation upgrades including: High Altitude Observatory (HALO) with the Infrared Imaging System (IRIS) based at Aeromet, Inc. in Tulsa, OK; the Remote Area Safety Aircraft (RASA) based at Point Mugu, CA; the SeaLite Beam Director (SLBD) at White Sands Missile Range, NM; KMR improvements and modernization; and the Kwajalein Mobile Range Safety System (KMRSS).

OPERATIONAL SUPPORT provides personnel and related support costs common to all NMD projects including support to the Office of the Director, Ballistic Missile Defense Organization (BMDO) and his staff located in Washington, DC, as well as BMDO's Executing Agents within the U.S. Army Space and Strategic Defense Command, U.S. Army PEO Missile Defense, U.S. Navy PEO for Theater Defense, U.S. Air Force PEO office and the Joint National Test Facility. This project supports funding for overhead/indirect personnel costs, benefits and infrastructure costs such as rents, utilities and supplies.

This project is assigned to the Budget Activity and Program Element codes as identified in this descriptive summary in accordance with existing Department of Defense policy.

PROJECT NUMBER: 3153
PROJECT TITLE: Architecture Analysis and BM/C^3 Initiatives
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0603872C RDT&E	6,799	8,273	8,099

PROJECT DESCRIPTION:
This project, which began in FY95, supports two offices within BMDO to ensure that appropriate issues relating to system architecture and Battle Management/Command, Control, and Communications (BM/C^3) are addressed in a coordinated and synergistic manner across all BMDO National Missile Defense (NMD) and Theater Missile Defense (TMD) efforts. The offices of Architecture Integrator and the BM/C^3 Office report directly and independently to the BMDO Director to provide the necessary mission-area oversight of critical BMDO technical issues.

In this project, BMDO supports systems analysis work to determine the expected operational performance and effectiveness of missile defense systems under development. Computer simulation models are developed and used to investigate architecture and system level capability and to resolve critical technical issues related to the development of specific elements of the architecture. Tradeoffs in alternative elements, specific designs, inventory and integration of systems are conducted in detail to determine the most cost effective approach for a particular missile defense mission. The work is performed on a continuing basis in order to determine the impact of changing threats, mission requirements, and advances in technology. The project provides BMDO with an independent assessment of the expected effectiveness of major programs under development and requirements for supporting technology. The work is separated into two program elements, one

for TMD and the other for NMD.

In this program element the focus is on TMD systems and technology. The primary thrust of the work is to show, through analysis, the need for and the expected performance of different defense systems under development to handle current and projected missile threats, both ballistic and cruise. Issues such as warhead lethality, system degradation in a severe countermeasure environment, target handover from tracking sensor to missile seeker, effects of netting sensors, etc. are some of the technical issues addressed in this project.

Future BM/C^3 activities in this project will provide for the mission area oversight and coordination of all BMDO BM/C^3 development and acquisition activities. This effort will provide for the synergistic evaluation of relevant BM/C^3 technical issues; the formulation of appropriate plans, programs, and policies to facilitate the coordination of all BMD Advanced Development BM/C^3 research, development, and acquisition activities across TMD and NMD program activities; promote appropriate reuse strategies to maximize BMD reuse capabilities; and minimize the duplication of BM/C^3 research and development efforts across all NMD and TMD development efforts.

PROJECT NUMBER: 3157
PROJECT TITLE: Environment, Siting, and Facilities
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0603872C RDT&E	5,972	3,600	3,640
0603872C MILCON	1,404	1,965	1,885

PROJECT DESCRIPTION:
Provides environmental program guidance, environmental impact analyses and documentation, real property facility siting, acquisition, and facility operational support for the Ballistic Missile Defense Organization (BMDO) Theater Missile Defense (TMD) system. Plans, programs, budgets, and oversees facility acquisition through the Military Construction (MILCON) and RDT&E construction programs. Provides guidance and supports BMDO TMD Environmental Assessment and Environmental Impact Statement process, environmental compliance, pollution prevention, and other environmental efforts for TMD activities. Develops guidance for Executing Agents on facilities, siting, acquisition, and environmental matters.

PROJECT NUMBER: 3160
PROJECT TITLE: TMD Readiness
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0603872C RDT&E	1,709	1,730	1,692

PROJECT DESCRIPTION:
This project supports Theater Missile Defense projects in the functional areas of manufacturing, logistics supportability and metrology design and support. These diverse functions map directly into meeting operational suitability and affordability goals. By focusing on all TMD (BMD) activities and coordinating these efforts between the Services and projects, common cost avoidance is realized. TMD readiness activities include producibility and planning for manufacturing, acquisition logistics, metrology, and training. The efforts will concentrate on identifying and analyzing critical TMD systems level deployment, support, Producibility and Manufacturing (P&M) risks, industrial base capability issues and developing mitigation plans for these areas to ensure operational requirements and BMDO affordability objectives are met. In addition, TMD operational suitability and availability advances and lessons learned are applied to NMD projects. This effort will also focus on the identification of critical TMD metrology requirements; and the development of national/DOD measurement standards and calibration support for TMD technology and acquisition programs.

PROJECT NUMBER: 3251
PROJECT TITLE: Systems Engineering and Technical Support
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0603872C RDT&E	50,909	65,260	62,031

PROJECT DESCRIPTION:
This project provides system engineering and technical support for the integration of Service-supplied weapon systems to facilitate the identification and resolution of inter-Service integration and interoperability issues; technical and engineering assessments and trade-off studies of Theater Missile Defense (TMD) system architectures and concepts; support for U.K. developed sensor data fusion methodology; Ballistic Missile Defense (BMD) system survivability oversight and assessment; risk reduction and acquisition streamlining support; modeling, simulation, experiment, and flight test support; development and maintenance of technical and programmatic databases; and preparation of technical reports, briefings, and programmatic documentation associated with TMD studies and critical issues.

PROJECT NUMBER: 3261
PROJECT TITLE: TMD BM/C^{3}I (BM/C^{3}I Concepts)
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0208864C PROC	19,696	0	0
0603872C RDT&E	32,357	34,094	35,864

PROJECT DESCRIPTION:
The primary mission of this project is to provide the warfighter with an integrated and interoperable Theater Missile Defense (TMD) Battle Management/Command, Control, Communications,

and Intelligence (BM/C^{3}I) capability having the flexibility to meet a wide range of threats and expected needs. The BM/C^{3}I architecture for TMD is built upon the existing command and control (C2) structure for Theater Air Defense (TAD) and adds the communications linking TMD C2 nodes, weapons, and sensors, and the TMD interfaces to intelligence systems and other supporting capabilities. The BMDO, from its joint perspective, uses this project to oversee independent weapon systems development and to provide guidance, standards, equipment, integration, and analysis to maximize the performance of a multitude of sensors, interceptors, and C2 nodes and to synergize their individual contributions to an integrated Joint theater-wide TMD system. BMDO has three major thrusts to the TMD BM/C^{3}I integration program.

The first thrust establishes the links and means for receipt of and in-theater dissemination of early warning and launch warning information from space-based and intelligence systems external to TMD. This project supports the system engineering of their capability and prototype development of items such as improved displays for early in-theater warning information. This project focuses on linking separate external systems into the theater.

The second thrust of the BM/C^{3}I program focuses on communication and interoperability among TMD weapon systems. Interoperability includes both the communications equipment, and protocols as well as the common command and control procedures among different weapons systems to ensure a truly integrated theater-wide ballistic missile defense system. The cornerstone of TMD interoperability is the Joint Data Net (JDN) which uses the Joint Tactical Information Distribution System (JTIDS) and the Tactical Data Information Link-JTIDS (TADIL-J) message format. This project integrates JTIDS terminals into existing Theater Ballistic Missile Defense (TBMD) C2 platforms and provides the necessary software upgrades. This funding is critical for timely inter-Service interoperabiltiy.

The third thrust of the BM/C^{3}I program directs attention to upgrades of Service C2 centers. Various command center upgrades are included in this project to reduce decision-making time necessary to effectively engage ballistic missiles. Again, BMDO leverages off several existing Service-funded theater air defense command center upgrades and this project funds only the specific TMD-related aspects of these upgrades. BMDO's central direction and support of hardware and software developments will produce an integrated C2 capability for TMD.

The joint warfighters and BM/C^{3}I developers evaluate the effects of early warning, improved interoperability, integration, and command center upgrades on joint TBMD doctrine through BM/C^{3}I work shops and analysis.

All of the efforts in this project are designed to provide a seamless interoperable architecture to provide timely warning and information necessary to reduce decision times and allow more opportunities to efficiently and effectively engage hostile missiles. The end result will kill more missiles and will reduce casualties to U.S. and other friendly forces.

PROJECT NUMBER: 3265
PROJECT TITLE: User Interface
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	FY98	FY99
0603872C RDT&E	14,031	14,680	21,976

PROJECT DESCRIPTION:

This project provides the Joint Staff and the warfighting Commanders-in-Chief (CINCs) with the means to ensure that the Theater Missile Defense (TMD) development reflects evolving military needs and the combined warfare capabilities of allies and friends. To accomplish this, there must be clearly articulated tactics, doctrine, policies, and procedures. The three areas which provide the information base to effectively transition TMD capabilities into the existing and planned operational activities and war plans are described below.

The project's primary area is focused on the refinement of existing and near term TMD capabilities. This is accomplished through the CINC's TMD Assessments Program, which involves the execution of numerous operationally realistic military exercises. These exercises provide the basis for the assessment, development, and improvement of TMD capabilities. Specific activities include the integration of new technology and hardware into the CINC operations, and the integration of User Operational Evaluation Systems (UOES) to examine the effectiveness of architectures and operational concepts. UOES is a prototype operational system of hardware and procedures which will be user operated for field evaluation purposes. Through the Assessments Program, the CINCs develop Battle Management Command, Control, and Communications (BM/C^3) architectures, formulate and test operational concepts, and determine or refine operational requirements. This program exercises communications architectures and develops operational concepts that will enable rapid integration of the PATRIOT Advanced Capability (PAC-3), Theater High Altitude Area Defense (THAAD), and Navy Area Theater Ballistic Missile Defense (TBMD) into the theater's warfighting capability. In future years, the CINCs' TMD Assessment Program will continue to develop ways to improve the CINCs' warfighting capabilities and integrate emerging TMD capabilities through simulation and employment of UOES hardware. Within the context of Combined Warfare, the Assessments Program focuses on providing the means for the U.S. and its allies to develop an understanding of each other's doctrine and common concepts of operation, and to determine equipment compatibility and interoperability.

The second area focuses on understanding the changing threat and how to best counter that threat. This is accomplished through the conduct of Warfare Analysis Laboratory Exercises (WALEX). Relying primarily on computer simulation tools and real experiences from the CINC's Assessment program, these exercises are performed to educate the TMD development community concerning the challenges presented by the theater missile threat. The WALEX provide forums for discussion of complex issues associated with concepts of operation for existing and future capabilities.

The third area focuses on the integration of warfighter operational requirements with near and far term Ballistic Missile Defense (BMD) program development. TMD programs (e.g., THAAD, Navy TBMD, etc.) are in various stages of development, and are scheduled for future deployment. This project area ensures that the experiences gleaned from such programs as the CINC's Assessment program are factored into all TMD programs. These programs are to develop and acquire TMD systems and architectures to (a) deploy theater missile defense capability to protect forward-deployed armed forces of the U.S., friends, and allies; and, (b) demonstrate advanced technologies for near-term insertion options and concept development of new systems. Analyses and simulations address systems effectiveness of proposed TMD system architectures against ballistic

missile threats to U.S. deployed forces, our allies and friends. Analytical results are also used to support activities required for the Defense acquisition process. Theater gaming with the CINCs is also supported to identify roles, missions, and requirements for TMD.

PROJECT NUMBER: 3270
PROJECT TITLE: Threat and Countermeasures Program
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0603872C RDT&E	21,419	27,986	29,154

PROJECT DESCRIPTION:
Threat and Countermeasures Program. The BMDO Theater Missile Defense (TMD) Threat Program defines potential adversary military forces, principally Theater Ballistic Missile (TBM) threats. To accomplish this mission, BMDO has a threat development program which is based on intelligence community projections and is traceable to quantifiable analysis. This project produces capstone threat and countermeasure documentation to ensure consistent technical threat definitions across all the Services. It does not duplicate Service-unique activities. The program consists of three component tasks: Intelligence Threat, Countermeasures Integration, and System Threat Scenario Generation.

PROJECT NUMBER: 3352
PROJECT TITLE: Modeling and Simulations
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0603173C RDT&E	2,002	1,554	1,898

PROJECT DESCRIPTION:
This project provides for the development/modification and validation of Modeling and Simulation (M&S) techniques and tools that are critical in assessing the projected, alternative, and demonstrated performance capabilities of Theater Missile Defense (TMD) and National Missile Defense (NMD) systems. These large and complex M&S tools require high-performance vector and parallel processing supercomputers, scalar processors, and advanced graphic workstations for operation. Portions of this processing capability are housed at the Joint National Test Facility (JNTF) in Colorado Springs, CO, and the Advanced Research Center/Simulation Center (ARC/SC) in Huntsville, AL. These facilities operate in a distributed integrated simulation environment and host the modeling and simulation war games that provide analysis, integration, demonstration, and performance verification of Ballistic Missile Defense (BMD) systems. These facilities and the Joint Missile Defense Network (JMDN), which links BMD contractors, Services, and other DoD government facilities, are utilized by all Services. Procedures are established to ensure efficient utilization of these facilities and to provide Verification, Validation, and Accreditation (VV&A) of the models, simulations, and systems portrayed. This cost-effective approach reduces the need for more costly live fire missile test programs and establishes requirements for future

technology needs. It promotes enhancements of M&S technologies that support: the acquisition process; the development of fielding of operational capabilities; and the development of common tools, methodologies, and protocols beneficial to data exchange, integration of various models and simulations, and software reusability of M&S applications.

Funding for these facilities is distributed through Project 3352. Three Program Elements (PEs) (NMD, TMD, and Support Technology) provided funding. This cost sharing approach ensures cooperation, contributes to achieving synergy across the efforts, and minimizes duplication of modeling and simulation resources. The total funding profile remains flat on an annual basis, with adjustments for inflation. For example, the decrease in TMD funding for JNTF in FY97 is offset by a corresponding increase in NMD funding. These PEs include the costs for operations and maintenance of these facilities which includes: computer hardware and software; communications networks; security; and other essential capabilities necessary to develop and operate configurable, multiple experiment test bed environments. This document describes the support technology portion of funding for these activities.

PROJECT NUMBER: 3352
PROJECT TITLE: Modeling and Simulations
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0603872C RDT&E	64,180	73,173	72,984

PROJECT DESCRIPTION:
This project provides for the development/modification and validation of Modeling and Simulation (M&S) techniques and tools that are critical in assessing the projected, alternative, and demonstrated performance capabilities of Theater Missile Defense (TMD) and National Missile Defense (NMD) systems. These large and complex M&S tools require high performance vector and parallel processing supercomputers, scalar processors, and advanced graphic workstations for operation. Portions of this processing capability are housed at the Joint National Test Facility (JNTF) in Colorado Springs, CO, and the Advanced Research Center/Simulation Center (ARC/SC) in Huntsville, AL. These facilities operate in a distributed integrated simulation environment and host the modeling and simulation wargames that provide analysis, integration, demonstration, and performance verification of BMD systems. The JNTF and ARC/SC facilities and the Joint Missile Defense Network (JMDN), which links BMD Contractors, Services and other DoD government facilities, are utilized by all Services. Procedures are established to ensure efficient utilization of these facilities and to provide Verification, Validation, and Accreditation (VV&A) of the models, simulations, and systems portrayed. This cost effective approach reduces the need for more costly live fire missile test programs and establishes requirements for future technology needs. It promotes enhancements of M&S technologies that support: the acquisition process; the development and fielding of operational capabilities; and the development of common tools, methodologies, and protocols beneficial to data exchange, integration of various modeling and simulations, and software reusability of M&S applications.

This project funds the development, operation, and VV&A of the Extended Air Defense Test Bed (EADTB) and the Extended Air Defense Simulation (EADSIM) which support the analysis

required for TMD program acquisition and integration. The EADTB is a flexible distributed simulation tool that can determine the performance of existing and conceptual extended air and missile defense systems with the added complexity of theater missile defense threats. This is a multinode test bed that is comprised of high and medium fidelity models of sensors, environments, weapon systems, threats, and Battle Management Command, Control and Communication (BM/C^3) systems. The capabilities of the EADTB are being incrementally developed and accredited with the Services. EADSIM is a low to medium detail simulation system that operates on a standalone workstation. This simulation is used for architectural analysis of EAD systems and provides user interface for scenario preparation and model description.

M&S activities also funded by this project include: development, enhancement, and maintenance of the theater test beds and conduct of war games that provide the analysis, integration, demonstration, and performance verification for TMD systems. It ensures joint usage of simulation tool resources, supports allied and friendly international participation and cooperation in wargaming exercises. This project focuses M&S support in five primary areas: standardization, assessments, development/modification, computer architectures/networks, and program management for BMDO and Service M&S programs.

Funding for these facilities is distributed through Project 3352. Three Program Elements (PEs), (NMD,TMD, and Support Technology) provided funding. This cost sharing approach ensures cooperation, contributes to achieving synergy across the efforts, and minimizes duplication of modeling and simulation resources. The total funding profile remains flat on an annual basis, with adjustments for inflation. For example, the decrease in TMD funding for JNTF in FY97 is offset by a corresponding increase in NMD funding. These PEs include the costs for operations and maintenance of the JNTF and ARC/SC facilities, and the JMDN which includes: computer hardware and software, communications networks, security, and other essential capabilities necessary to develop and operate reconfigurable, and multiple experiment test bed environments. This document describes the TMD portion of funding for these activities.

PROJECT NUMBER: 3354
PROJECT TITLE: Targets Support
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0603872C RDT&E	22,842	27,603	18,721

PROJECT DESCRIPIION:
This project provides core funding for targets and services needed to support the testing and evaluation of all Theater Missile Defense (TMD) programs, in particular THAAD, PATRIOT PAC-3, Navy Area TBMD and Navy Theater Wide TBMD, USMC Hawk, and the U.S. Air Force Air Borne Laser (ABL). This project is a segment of the BMDO Consolidated Targets Program (CTP). The CTP mission is to provide threat representative ballistic missile target system support to interceptor and sensor development and acquisition programs. Each target system is tailored and reconfigured to meet unique mission requirements for each test. This project funds the development and demonstration of target systems and Foreign Military Acquisition (FMA) targets to

support TMD test and evaluation. The TMD programs fund the actual acquisition of Theater targets development of this program. The Theater High Altitude Area Defense (THAAD) system, Patriot Advanced Capability-3 (PAC-3) system, Navy Area TBMD (Lower Tier) and Navy Theater Wide TBMD (Upper Tier) systems require target system support to accomplish their planned test and evaluation. The THAAD program intends to use the Hera target system with planned launches at White Sands, NM and from Wake Island into the Kwajalein Missile Range (KMR) impact area. Additionally, THAAD testing in the Pacific requires short range (200-600 km) and long range (1,000-2,900 km) target presentations which require development of a long range air launch target system. The PAC-3 program will use STORM and Hera targets launched from White Sands and Wake Island. The Navy will use the air launch target launched at Pacific Missile Range Facility (PMRF) (Barking Sands, Kauai, HI). This project is developing a short range (200-600 km) air drop ballistic target and a long range (1,000-2,900 km) winged air-launched target to satisfy the collective target requirements of THAAD and both Navy programs for multiple simultaneous engagements, multi-axis scenarios, and short-range and long-range threat target presentations. The project is also developing reentry vehicles to simulate the full range of threat targets.

PROJECT NUMBER: 3359
PROJECT TITLE: System Test & Evaluation
PROGRAM ELEMENT/FUNDING ($ in Thousands:

	FY97	**FY98**	**FY99**
0603872C RDT&E	42,792	40,307	26,444

PROJECT DESCRIPTION:
This project provides for BMDO planning, oversight, and coordination of integrated Test and Evaluation activities, as well as inter-Service Test and Evaluation efforts for assessment of the Family of Systems (FoS). Once the test plans are developed, test resource and target development and support is provided. (Test resources located in Project 3360 include test facilities, ranges and test instrumentation; target development and support is found in Project 3354). The program provides for support to the Major Defense Acquisition Program (MDAP) mandatory Live-Fire Test and Evaluation (LFT&E). This includes estimates of probability of kill of chemical/biological submunitions, creation of models to determine chemical/biological ground effects, confirmation of damage laws from low mass/high velocity intercepts, confirmation of damage laws from high velocity rods, development of generic lethality targets. Additionally, this project provides the following: independent assessments of the JTMD system; maturity evaluation of technology programs; multiple-fidelity models and simulation to support system development testing; and execution of independent technical reviews, system analyses and performance evaluations which contribute to new or enhanced capabilities; management of the development process, and the decision-making process related to the allocation of resources. The performance evaluation has as its primary goals the identification and understanding of system-level performance drivers and the mitigation of technical risk, and to provide timely answers to critical issues and questions required by decision authorities through an annual Consolidated Evaluation Report (CER).

PROJECT NUMBER: 3360
PROJECT TITLE: Test Resources
PROGRAM ELEMENT/FUNDING($ in Thousands):

	FY97	FY98	FY99
0603872C RDT&E	35,507	30,888	30,201

PROJECT DESCRIPTION:
This project provides for BMDO planning, oversight and coordination of integrated test and evaluation facilities. The project includes inter-element as well as inter-Service test and evaluation efforts, and provides infrastructure for common ground test facilities, ranges and instrumentation. Project 3360 funds the common TMD test infrastructure costs including BMDO use. Individual programs pay only the direct costs associated with their specific testing efforts.

The mission common ground test facilities include:

- Kinetic Kill Vehicle Hardware-in-the-Loop Simulator (KHILS) at Eglin AFB, FL
- Aero Optic Evaluation Center (AOEC) located at Calspan Corp, Buffalo, NY
- Hypervelocity Wind Tunnel Number 9 (Tunnel 9) at the Naval Surface Warfare Center, White Oak, MD
- National Hover Test Facility (NHTF) at Edwards AFB, CA
- Army Missile Optical Range (AMOR) at the U.S. Army Missile Command, Redstone Arsenal, AL
- Infrared and Blackbody Standards at the National Institute of Standards and Technology (NIST) in Gaithersburg, MD.
- Hypervelocity Ballistic Range G Light Gas Gun at the Arnold Engineering and Development Center (AEDC) in Tullahoma, TN
- Captive Carry Capability at the Nevada Test Site
- 7V and 10V Space Chambers at the Arnold Engineering Development Center, Tullahoma, TN
- Portable Optical Sensor Tester (POST) and the Characterization of Low Background Mosaics (CALM) at Rockwell International, Anaheim, CA
- Naval Research and Development (NRaD) facility IR Devices Branch located at the Naval Command, Control and Ocean Surveillance Center, San Diego, CA
- The Center for Research Support (CERES) at the Joint National Test Facility, Falcon AFB, CO

The mission common range facilities include national ranges such as:

- White Sands Missile Range (WSMR) located in Las Cruces, NM

- Kwajalein Missile Range (KMR) located in the South Pacific and the Wake Island Complex located in the North Pacific Ocean
- Pacific Missile Range Facility (PMRF) located at Kauai, HI
- Gulf Test Range (GTR) located at Eglin AFB, Fort Walton Beach, FL.

The range instrumentation special test equipment, data collection assets, and range instrumentation include:

- High Altitude Observatory (HALO) with the Infrared Imaging System (IRIS) sensor, based at Aeromet, Inc., Tulsa, OK
- Sea-Lite Beam Director (SLBD), based at White Sands Missile Range, Las Cruces, NM
- High Altitude Optical Imaging System (HAOIS), based at White Sands Missile Range, Las Cruces, NM.
- Mobile Range Safety System and Kwajalein Range Safety Control System Upgrades
- NP-3 Aircraft upgrade for remote area safety support.
- Miscellaneous improvements to BMDO infrastructures and support systems

These ground test, range and instrumentation assets provide valuable risk reduction and test implementation capability in support of the TMD test and evaluation. The ground test facilities provide a cost effective method of testing and evaluating applicable component, subsystem and system level technologies. The common range facilities provide a cost effective method of flight testing missile and target components applicable to the TMD program and FoS, BM/C^3 and interoperability testing. The range instrumentation provides a cost effective capability to collect target signature characteristics, phenomenology data, and target/interceptor diagnostics on flight tests. These facilities and capabilities support systems design, verification and validation of target realism, and the evaluation of test results.

PROJECT NAME: 4000
PROJECT TITLE: Operational Support
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0603173C RDT&E	26,907	30,206	31,992

PROJECT DESCRIPTION:
This project provides support in three basic areas: personnel and related support costs; funding to meet cost fluctuations and contract terminations; and management overhead required for the Support Technology program.

Personnel and related support costs common to all Support Technology projects include support

of the Office of the Director, Ballistic Missile Defense Organization and his staff located within the Washington, DC area, as well as BMDO's Executing Agents within the U.S. Army Space & Strategic Defense Command, U.S. Army PEO Missile Defense, U.S. Navy PEO for Theater Defense, U.S. Air Force PEO office, and the National Test Facility. This project supports funding for overhead/indirect personnel costs, benefits, and infrastructure costs such as rents, utilities, supplies, etc.

The BMDO prioritizes funding within this project to meet operational, contractual, and statutory fiscal requirements for the Support Technology program. Operational requirements include reimbursable services acquired through the Defense Business Operating Fund (DBOF), such as accounting services provided by the Defense Finance and Accounting Service (DFAS). Contractual requirements include reserves for special termination costs on designated contracts and provisions for terminating other programs as required. BMDO has additional requirements to provide for foreign currency fluctuations on its limited number of foreign contracts. Finally, statutory requirements include funding for charges to canceled appropriations in accordance with Public Law 101-510.

Assistance required to support BMDO overhead management functions for the Support Technology program is contained in this project. This assistance ranges from operational contracts to fully support functions such as ADP operations, Access control offices, and graphics support, to supportive efforts required, as well as to supplement the BMDO government personnel. Typical efforts include cost estimating, security management, contracts management, strategic relations management and information management. These efforts include assessment of technical project design, development and testing, test planning, assessment of technology maturity and technology integration across BMDO projects; and support of design reviews and technology interface meetings. Program control tasks include assessment of schedule, cost, and performance, with attendant documentation of the many related programmatic issues. The requirement for this area is based on most economical and efficient utilization of contractors versus government personnel.

The Fiscal Year 1996 Defense Authorization Act eliminates the management program element effective with the Fiscal Year 1997 President's Budget submission. This overhead management and indirect program support funding has been realigned in accordance with Public Law 104-106.

PROJECT NAME: 4000
PROJECT TITLE: Operational Support
PROGRAM ELEMENT/FUNDING ($ in Thousands):

	FY97	**FY98**	**FY99**
0603872C RDT&E	82,876	87,516	84,809

PROJECT DESCRIPTION:
This project provides support in three basic areas: personnel and related support costs; funding to meet fluctuation costs and contract terminations; and assistance required to fund support service contracts for the Theater Missile Defense (TMD) program.

Personnel and related support costs common to all TMD projects include support of the Office of

the Director, Ballistic Missile Defense Organization and his staff located within the Washington, D.C. area, as well as BMDO's Executing Agents within the U.S. Army Space & Strategic Defense Command, U.S. Army PEO Missile Defense, U.S. Navy PEO for Theater Defense, U.S. Air Force PEO office, and the National Test Facility. This project supports funding for overhead/indirect personnel costs, benefits, and infrastructure costs such as rents, utilities, supplies, etc.

The BMDO prioritizes funding within this project to meet operational, contractual, and statutory fiscal requirements for the TMD program. Operational requirements include reimbursable services acquired through the Defense Business Operating Fund (DBOF), such as accounting services provided by the Defense Finance and Accounting Service (DFAS). Contractual requirements include reserves for special termination costs on designated contracts and provisions for terminating other programs as required. BMDO has additional requirements to provide for foreign currency fluctuations on its limited number of foreign contracts. Finally, statutory requirements include funding for charges to canceled appropriations in accordance with Public Law 101-510.

Assistance required to support BMDO overhead management functions for the TMD program is contained in this project. This assistance ranges from operational contracts to fully support functions such as ADP operations, automated tool, Access control offices, and graphics support, to supportive efforts required, as well as to supplement the BMDO government personnel. Typical efforts include cost estimating, security management, contracts management, strategic relations management and information management. These efforts include assessment of technical project design, development and testing, test planning, assessment of technology maturity and technology integration across BMDO projects; and support of design reviews and technology interface meetings. Program control tasks include assessment of schedule, cost, and performance, with attendant documentation of the many related programmatic issues. The requirement for this area is based on most economical and efficient utilization of contractors versus government personnel.

The Fiscal Year 1996 Defense Authorization Act eliminated the management program element effective with the Fiscal Year 1997 President's Budget submission. This overhead management and indirect program support funding has been realigned in accordance with Public Law 104-106.

Appendix C

Acronyms

Acronyms

AADC	Area Air Defense Commander
AAW	Anti-Air Warfare
AAWC	Anti-Air Warfare Commander
ABCCC	Airborne Battlefield Command and Control Center
ABL	Airborne Laser
ABM	Anti-Ballistic Missile
ABMC	Adaptive Battle Management Center
ACAT	Acquisition Category
ACCS	Airspace Command/Control System
ACDS	Advanced Combat Direction System
ACE	ARM Countermeasure Evaluator
ACE	Areas For Capability Enhancement
ACES	Arrow Continuation Experiments
ACS	AEGIS Combat System
ACS	Altitude Control System
ACTD	Advanced Concept Technology Demonstration
AD	Active Defense
ADCCS	Air Defense Command and Control System
ADCP	Air Defense Communications Platform
ADP	Arrow Deployability Project
ADP	Automated Data Processing
ADTOC	Air Defense Tactical Operations Center
AEDC	Arnold Engineering Development Center
AEGIS	Naval Shipboard Weapon System for TMD
AFB	Air Force Base
AGRE	Active Geophysical Rocket Experiment

AHWG	Ad Hoc Working Group
AIMST	Advanced Interceptor Materials and Systems Technology
AIT	Atmospheric Interceptor Technology
ALERT	Attack and Launch Early Reporting to Theater
ALI	AEGIS LEAP Interceptor
ALI	Alpha/LAMP Integration
AMG	Antenna Mast Group
AMOR	Army Missile Optical Range
AMSC	Advanced Missile Signature Center
AO	Attack Operations
AOA	Airborne Optical Adjunct
AOC	Air Operations Center
AOEC	Aero Optic Evaluation Center
ARC	Advanced Research Center
ARC/SC	Advanced Research Center/Simulation Center
ARFOR	Air Force Commander
ARM	Anti-Radiation Missile
AST	Advanced Sensor Technology
AST	Airborne Surveillance Testbed
ASTP	Advanced Sensor Technology Program
ATBM	Anti-Tactical Ballistic Missile
ATP	Acquisition, Tracking And Pointing
ATP/FC	Acquisition, Tracking, Pointing and Fire Control
ATSD (NCB)	Assistant to the Secretary of Defense for Nuclear, Chemical, and Biological Programs
AWACS	Airborne Warning and Control System
AWS	AEGIS Weapon System
AWS	Arrow Weapon System

BCP	Battery Command Post
BES	Budget Estimate Submission
BM/C^3	Battle Management/Command, Control, and Communications
BM/C^3I	Battle Management/Command, Control, Communications, and Intelligence
BM/C^4I	Battle Management/Command, Control, Communications, Computers, and Intelligence
BMD	Ballistic Missile Defense
BMDO	Ballistic Missile Defense Organization
BMEWS	Ballistic Missile Early Warning System
BPI	Boost Phase Intercept/Interceptor
BUR	Bottom-Up Review
C^2	Command and Control
C^2 Sim	Command and Control Simulation
C^3	Command, Control, and Communications
C^3I	Command, Control, Communications, and Intelligence
C^4I	Command, Control, Communications, Computers, and Intelligence
CALM	Characterization of Low Background Mosaics
CARD	Cost Analysis Requirements Document
CDI	Classification, Discrimination, and Identification
CDR	Critical Design Review
CDS	Congressional Descriptive Summaries
CEC	Cooperative Engagement Capability
CER	Consolidated Evaluation Report
CERES	Center for Research Support
CG	Cruiser (Guided Missile)
CHOP	Countermeasures Hands On Program
CI	Capability Increment
CIC	Combat Integration Capability

CINC	Commander-in-Chief
CJCS	Chairman of the Joint Chiefs of Staff
CM	Cruise Missile
CMI	Countermeasures Integration
CMIP	Countermeasure Integration Program
CNAD	Conference of National Armaments Directors
CoDR	Conceptual Design Review
COEA	Cost and Operational Effectiveness Analysis
CONOPS	Concept of Operations
CONUS	Continental United States
Corps SAM	Corps Surface to Air Missile
COTS	Commercial off the Shelf
CP	Counterproliferation
CPRC	Counterproliferation Review Committee
CRC	Control and Reporting Center
CRD	Capstone Requirements Document
CRP	Communications Relay Platform
CSED	Combat System Engineering Development
CTP	Consolidated Targets Program
CTR	Cooperative Threat Reduction Program
CTV	Control Test Vehicle
CVN	Aircraft Carrier (Nuclear Powered)
D/S	Down Select
DAB	Defense Acquisition Board
DACS	Divert and Attitude Control System
DARPA	Defense Advanced Research Projects Agency
DBM	Distributed Battle Management

DBOF	Defense Business Operating Fund
Dem/Val	Demonstration and Validation
DFAS	Defense Finance and Accounting Service
DGP	Defense Group on Proliferation
DIA	Defense Intelligence Agency
DISA	Defense Information Systems Agency
DITP	Discriminator Interceptor Technology Program
DoD	Department of Defense
DSP	Defense Support Program
DSTO	Defense Science Technology Organization
DT/OT	Demonstration Test/Operational Test
DT/OT	Developmental Testing/Operational Testing
DTR	Development Test Round
DUNDEE	Down Under Early Warning Experiment
E-2	Hawkeye Aircraft
E3	Electromagnetic Environmental Effects
EA	Environmental Assessment
EADTB	Extended Air Defense Test Bed
EAD/TMD	Extended Air Defense/Theater Air Defense
EADSIM	Extended Air Defense Simulation
EAGLE	Extended Airborne Global Launch Evaluator
ECC	Experiment Control Center
ECCM	Electronic Counter-Countermeasure
ECS	Engagement Control Station
EFEX	Endoatmospheric Aerothermal Flight Test Experiment
EIAP	Environmental Impact Analysis Process
EKV	Exoatmospheric Kill Vehicle

EMD	Engineering and Manufacturing Development
EOC	Element Operations Center
EPP	Electric Power Plant
ERD	Element Requirements Document
ERINT	Extended Range Intercept Technology
ETB	Electronic Test Bed
ETR	Engineering Test Round
EWR	Early Warning Radar
FBXR	Forward-Based X-band Radar
FC	Fire Control
FDP	Flight Demonstration Program
FDS	Flight Demonstration System
FEA	Front End Assessment
FM	Field Manual
FPA	Focal Plane Array
FOC	Full Operational Capability
FoS	Family of Systems
FPA	Focal Plane Array
FRP	Full Rate Production
FSU	Former Soviet Union
FUE	First Unit Equipped
FYDP	Future Years Defense Program
GBI	Ground Based Interceptor
GBR	Ground Based Radar
GBR-P	Ground Based Radar-Prototype
GCCS	Global Command and Control System
GEM	Guidance Enhancement Missile

GEO	Geosynchronous Earth Orbit
GOI	Government of Israel
GPALS	Global Protection Against Limited Strikes
GTACS	Ground Tactical Air Control System
GTR	Gulf Test Range
GTV	Guidance Test Vehicle
HABE	High Altitude Balloon Experiment
HALO	High Altitude Observatory
HAOIS	High Altitude Optical Imaging System
HARS	High Accuracy Reacquisition Sensor
HAWK	Homing All The Way Killer
HBCU/MI	Historically Black Colleges and Universities/Minority Institutions
HE	High Explosive
HELSTF	High Energy Laser System Test Facility
HEO	Highly Elliptical Orbit
HgCdTe	Mercury Cadmium Telluride
HIL	Human-In-The-Loop
HMMWV	High Mobility Multi Wheeled Vehicle
HWIL	Hardware-In-The-Loop
HWILT	Hardware-In-The-Loop Testing
I-HAWK	Improved HAWK
IAEA	International Atomic Energy Agency
IBIS	Israeli Boost Phase Interceptor System
IBS	Integrated Broadcast System
IDD	Interoperability Description Document
IDP	Integrated Deployment Plan
IER	Information Exchange Requirement

IFICS	In-flight Interceptor Communication System
IFOG	Interferometric Fiber Optic Gyro
IFT	Integrated Flight Test
IFTU	In-Flight Target Update
IGT	Integrated Ground Test
IIPT	Integration Integrated Product Team
IMoD	Israeli Ministry of Defense
IMU	Inertial Measurement Unit
InSb	Indium Antimonide
IOC	Initial Operational Capability
IPT	Integrated Product Team
IR	Infrared
IRIS	Infrared Imaging System
IRMA	Israeli Reference Missile Architecture
IR/RF	Infrared/Radio Frequency
IRST	Infrared Search and Track
ISA&I	Israeli System Architecture and Integration
IS&T	Innovative Science and Technology
IST	Integrated System Test
ISTC	Integrated System Test Capability
ITB	Israeli Test Bed
ITW/AA	Integrated Tactical Warning/Attack Assessment
JCS	Joint Chiefs of Staff
JCTN	Joint Composite Tracking Network
JDN	Joint Data Network
JEIO	Joint Interoperability Engineering Organization
JFACC	Joint Force Air Component Commander

JFC	Joint Forces Commander
JFLCC	Joint Forces Land Component Commander
JFMCC	Joint Forces Maritime Component Commander
JMCIS	Joint Maritime Command Information System
JMDN	Joint Missile Defense Network
JNTB	Joint National Test Bed
JNTF	Joint National Test Facility
JPN	Joint Planning Network
JRE	JTIDS Range Extension
JROC	Joint Requirements Oversight Council
JS List	Joint Staff List
JSTARS	Joint Surveillance and Target Attack Radar System
JTADS	Joint TADIL-A Distribution System
JTAGS	Joint Tactical Ground Station
JTAMD	Joint Theater Air and Missile Defense
JTAMDO	Joint Theater Air and Missile Defense Organization
JTIDS	Joint Tactical Information Distribution System
JTMD	Joint Theater Missile Defense
JWCA	Joint Warfare Capabilities Assessment
KE	Kinetic Energy
KHILS	Kinetic Kill Vehicle Hardware-In-The-Loop Simulator
KKV	Kinetic Kill Vehicle
KMR	Kwajalein Missile Range
KMRSS	Kwajalein Mobile Range Safety System
KV	Kill Vehicle
KW	Kinetic Warhead
LACM	Land Attack Cruise Missile

LADAR	Laser Detection And Ranging
LADS	Low Altitude Demonstration System
LAMP	Large Aperture Mirror Program
LCC	Launcher Control Center
LDS	Lexington Discrimination System
LEAP	Lightweight Exoatmospheric Projectile
LEO	Low Earth Orbit
LFT&E	Live Fire Test and Evaluation
LHA	Landing Helicopter Assualt Ship
LINK 11/16	Data Link Systems (JTDS / JTIDS)
LODE	Large Optics Demonstration Experiment
LOS	Large Optical Segment
LRIP	Low-Rate Initial Production
LSI	Lead System Integrator
LWIR	Long Wavelength Infrared
M&S	Materials and Structures
M&S	Modeling and Simulation
M/LWIR	Medium/Long Wavelength Infrared
MD	Missile Defense
MACCS	Marine Air Command and Control System
MDAP	Major Defense Acquisition Program
MAGTF	Marine Air Ground Task Force
MAOC	Modular Air Operations Center
MARFOR	Marine Forces Commander
MDA	Missile Defense Act
MDAP	Major Defense Acquisition Program
MDDC	Missile Defense Data Center

MDHAG	Missile Defense Ad Hoc Group
MDT	MSX Dedicated Target
MEADS	Medium Extended Air Defense System
MESAR	Multifunction Electronically Scanned Aperture Radar
MIDS	Multifunctionsl Information System
MILCON	Military Construction
MILSATCOM	Military Satellite Communications
MIRV	Multiple Independently-Targetable Reentry Vehicle
MM&D	Micro-Meteoroid and Debris
MMIC	Monolithic Microwave Integrated Circuit
MNS	Mission Need Statement
MoD	Ministry of Defense
MOR	Military Operational Requirement
MOP	Memorandum Of Policy
MOU	Memorandum Of Understanding
MQW	Multiple Quantum Well
M/S	Modeling and Simulation
MS II	Milestone II
MSE	Maintenance Support Equipment
MSLS	Multi-Service Launch System
MSTI	Miniature Sensor Technology Integration
MSX	Midcourse Space Experiment
MTCR	Missile Technology Control Regime
MTTV	Maneuvering Tactical Target Vehicle
MWIR	Mid-Wavelength Infrared
NAMEADSMA	NATO MEADS Management Agency
NAMEADSMO	NATO MEADS Design and Development, Production, and Logistics

	Management Organization
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NBC	Nuclear, Biological, and/or Chemical
NDI	Non-Developmental Item
NEPA	National Environmental Protection Act
NHTF	National Hover Test Facility
NII	National Information Infrastructure
NIST	National Institute of Standards and Technology
NMD	National Missile Defense
NMD-GBR-P	National Missile Defense-Ground Based Radar-Prototype
NORAD	North American Aerospace Defense Command
NP	Nonproliferation
NP-3	Navy Patrol Aircraft
NPT	Nuclear Nonproliferation Treaty
NRaD	Naval Research and Development
NRL/NAST	Naval Research Laboratory/Navy Air Systems Team
NSG	Nuclear Suppliers Group
NTW	Navy Theater Wide
OASD	Office of the Assistant Secretary of Defense
OCA	Offensive Counter-air Operations
OIPT	Overarching Integrated Product Team
OPEVAL	Operational Evaluation
ORD	Operational Requirements Document
OSC	Optical Signature Code
OSD	Office of the Secretary of Defense
OTA	Office of Technology Applications

P^3I	Pre-Planned Product Improvement
P&M	Producibility and Manufacturing
PA&E	Program Analysis and Evaluation
PAC	PATRIOT Advanced Capability
PAC-1	PATRIOT Advanced Capabiliy-1
PAC-2	PATRIOT Advanced Capability Level-2
PAC-3	PATRIOT Advanced Capability Level-3
PATRIOT	Phased Array Tracking to Intercept Of Target
PAVE PAWS	Position and Velocity Extraction, Phased Array Warning System
PBD	Program Budget Decision
PD	Passive Defense
PD/V	Project Definition/Validation
PDR	Preliminary Design Review
PD/RR	Program Definition/Risk Reduction
PE	Program Element
PEO	Program Executive Office
PFS	Pre-Feasibility Study
PHST	Packaging Handling Storage Transportation
PIPT	Program Integrated Product Team
PLANEX	Planning Exercise
PLS	Palletized Loading System
PLV	Payload Launch Vehicle
PM	Project Manager
PMRF	Pacific Missile Range Facility
POM	Program Objectives Memorandum
POP	Proof Of Principle
POST	Portable Optical Sensor Tester

PQT	Production Qualification Test
PRC	Peoples Republic of China
PtSi	Platinum Silicide
QRP	Quick Reaction Program
QRP	Quick Response Program
QWIP	Quantum Well Infrared Photometer
R&D	Research and Development
RAM	Random Access Memory
RAMOS	Russian-American Observation Satellites
RASA	Remote Area Safety Aircraft
RCS	Radar Cross Section
RDT&E	Research Development Test and Evaluation
RFP	Request For Proposal
RHETT	Russian Hall Effect Thruster Technology
RISC	Reduced Instruction Set Computer
R&M	Reliability and Maintainability
ROW	Rest-Of-World
RSO	Resident Space Object
RTD	Radar Technology Demonstrator
RV	Reentry Vehicle
SAAWC	Sector Anti-Air Warfare Coordinator
SACEUR	Supreme Allied Command, Europe
SACLANT	Supreme Allied Command, Atlantic
SALT	Strategic Arms Limitation Talks
SAM	Surface to Air Missile
SAMMES	Space Active Modular Materials Experiment System
SBIR	Small Business Innovation Research

SBIRS	Space Based Infrared System
SBL	Space Based Laser
SBLRD	Space Based Laser Readiness Demonstrator
SCARLET	Solar Concentrator Array with Linear Element
SCC	Standing Consultative Commission
SCORE	Scientific Cooperative Research Exchange
SDI	Strategic Defense Initiative
SDR	System Design Review
SE&I	System Engineering and Integration
SEO	Survivability Enhancement Options
SES	Seeker Experimental System
SGI	Silicon Graphics Incorporated
SI	System Integrator
SICPS	Standard Integrated Command Post Structure
SIGINT	Signals Intelligence
SIRTF	Space Infrared Telescope Facility
SIT	System Integration Test
SLBD	Sea Lite Beam Director
SM	Standard Missile
SM-2	Standard Missile-2
SM-3	Standard Missile-3
SMTS	Space and Missile Tracking System
SOI	Statement Of Intent
SPO	System Program Office
SPICE	Space Integrated Controls Equipment
SRBM	Short Range Ballistic Missile
SRD	System Requirements Document

SRMSC	Stanley R. Mickelson SAFEGUARD Complex
SRR	System Requirements Review
SSCARR	Sapphire Statistical Characterization and Risk Reduction
SSDA	Solid State Demonstration Array
SSGM	Synthetic Scene Generation Model
SSRT	Single Stage Rocket Technology
ST	System Threat
STA	System Threat Assessment
STANAG	Standardization Agreement (NATO)
STARS	Strategic Tactical Airborne Range System
STARS	Strategic Target System
START	Strategic Arms Reduction Treaty
STRV	Space Technology Research Vehicle
SWIL	Software-In-The-Loop
SWIR	Short Wavelength Infrared
SWORD	Stinger With Optimized Radar Distribution
TAOM	Tactical Air Operations Module
T&E	Test and Evaluation
T/R	Transmit/Receive
T4P	TIBS/TDDS/TACDAR Tactical Processor
TACC	Tactical Air Command Center (Marine Corps)
TACC	Tactical Air Control Center (Navy)
TACDAR	Tactical Detection and Reporting
TACS	Theater Air Control System
TAD	Theater Air Defense
TADIL	Tactical Data Information Link
TADIL-J	Tactical Data Information Link-J

TADIXS	Tactical Data Information Exchange System
TAMD	Theater Air and Missile Defense
TAOC	Tactical Air Operations Center
TAOM	Tactical Air Operations Module
TBIG	TMD BM/C^4I Integration Group
TBD	To Be Determined
TBM	Tactical Ballistic Missile
TBM	Theater Ballistic Missile
TBMCS	Theater Battle Management Core System
TBMD	Tactical Ballistic Missile Defense
TBMD	Theater Ballistic Missile Defense
TCMP	TMD Critical Measurements Program
TCTA	Time Critical Target Aid
TDDS	TRAP Data Dissemination System
TECHEVAL	Technical Evaluation
TEL	Transporter Erector Launcher
T&E	Test And Evaluation
TEMP	Test and Evaluation Master Plan
TEMS	THAAD Energy Management Steering
TES	Tactical Event System
TFTOC	Task Force Tactical Operations Center
THAAD	Theater High Altitude Area Defense
TIBS	Tactical Information Broadcast Service
TIWG	Test Integration Working Group (Army)
TMD	Theater Missile Defense
TMD-GBR	Theater Missile Defense - Ground Based Radar
TMDI	Theater Missile Defense Initiative

TMDSE	TMD System Exerciser
TOC	Tactical Operations Center
TOM	Target Object Map
TOPAZ	Thermionic Experiment Conversion Active Zone In Core
TPWG	Test Plan Working Groups (Air Force)
TRADOC	Training And Doctrine Command
TRAP	Tactical Related Applications Program
TRAP	Threat Risk Assessment Process
TRE	Tactical Receive Equipment
TSD	Tactical Surveillance Demonstration
TSDE	Tactical Surveillance Demonstration Enhancement
TSWG	Target Signature Working Group
U.K.	United Kingdom
UAV	Unmanned Aerial Vehicle
UAV/BPI	Unmanned Aerial Vehicle/Boost Phase Intercept
UEWR	Upgraded Early Warning Radar
UOES	User Operational Evaluation System
USACOM	United States Atlantic Command
USAF	United States Air Force
USAKA	United States Army Kwajalein Atoll
USCENTCOM	United States Central Command
USCINCSPACE	Commander-in-Chief, United States Space Command
USD(A&T)	Under Secretary of Defense (Acquisition & Technology)
USEUCOM	United States European Command
USFJ	United States Forces Japan
USFK	United States Forces Korea
USMC	United States Marine Corps

USPACOM	United States Pacific Command
USSPACECOM	United States Space Command
UV	Ultraviolet
VISS	Vibration Isolation Suppression System
VLWIR	Very Low Wavelength Infrared
VLS	Vertical Launch System
VV&A	Validation, Verification, and Accreditation
WALEX	Warfare Analysis Laboratory Exercise
WASS	Wide Area Surveillance Sensor
WMD	Weapons of Mass Destruction
WSMR	White Sands Missile Range
WTR	Western Test Range